

The Automobile: Its Province and Its Problems

The Annals

VOLUME CXVI

NOVEMBER, 1924

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THE AMERICAN ACADEMY OF POLITICAL AND SOCIAL SCIENCE

39TH STREET AND WOODLAND AVENUE

PHILADELPHIA

1924

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EUROPEAN AGENTS

ENGLAND: P. S. King & Son, Ltd., 2 Great Smith Street, Westminster, London, S. W.
FRANCE: L. Larose, Rue Soufflot, 22, Paris.
GERMANY: Mayer & Müller, 2 Prinz Louis Ferdinandstrasse, Berlin, N. W.
ITALY: Giornale Degli Economisti, via Monte Savello, Palazzo Orsini, Rome.
SPAIN: E. Dossat, 9 Plaza de Santa Ana, Madrid.

CONTENTS

THE AUTOMOBILE—ITS PROVINCE AND PROBLEMS

FOREWORD	vii
The Editor.	
PART I. THE SERVICES OF THE AUTOMOBILE	
THE MOTOR'S PART IN TRANSPORTATION	1
Roy D. Chapin, Vice-President, National Automobile Chamber of Commerce	
THE AUTOMOBILE AND ALLIED TRADES AND INDUSTRIES	9
Alfred H. Swayne, Vice-President, General Motors' Corporation; Director, National Automobile Chamber of Commerce	
THE AUTOMOBILE AND AMERICAN AGRICULTURE	12
John M. McKee, Deputy Secretary of Agriculture, Commonwealth of Pennsylvania	
THE MOTOR'S PART IN PUBLIC HEALTH	18
John C. Long, Manager, Educational Department, National Automobile Chamber of Commerce	
THE AUTOMOBILE AND THE PIONEER	21
William Joseph Showalter, Sc.D., Assistant Editor, <i>National Geographic Magazine</i>	
LINKING UP RAILROAD AND WATER TRANSPORTATION	25
Dorsey W. Hyde, Jr. Formerly with Packard Motor Car Company	
THE AUTOMOBILE AND RECREATION	32
M. H. James, Publicity Director, Department of Highways, Commonwealth of Pennsylvania	
THE ECONOMIC FUTURE OF THE AUTOMOBILE INDUSTRY	34
Charles Clifton, President, National Automobile Chamber of Commerce	
PART II. THE MANUFACTURE AND SALES OF AUTOMOBILES	
MACHINERY AND ITS EFFECT UPON THE WORKERS IN THE AUTOMOTIVE INDUSTRY	37
Charles Reitell, School of Business Administration, University of Pittsburgh	
FINANCING THE SALE OF AUTOMOBILES	44
J. A. Estey, Ph.D., Department of History and Economics, Purdue University	
FINANCING THE AUTOMOBILE	49
Henry G. Hodges, Ph.D., Treasurer, Reading Investment Company, Reading, Pa.	
PART III. THE AUTOMOBILE, THE HOME, THE SCHOOL AND THE CHURCH	
THE AUTOMOBILE AND THE "HOME" OF THE FUTURE	58
John F. Harbeson, M.S., School of Fine Arts, University of Pennsylvania	
THE PURITY OF ROADSIDE DRINKING WATER—WHAT PENNSYLVANIA IS DOING	60
W. G. Turnbull, M.D., Deputy Secretary of Health, Commonwealth of Pennsylvania	
CAMPING SITES IN PUBLIC PARKS AND FORESTS	62
L. F. Kneipp, Executive Secretary, National Conference on Outdoor Recreation	
THE AUTOMOBILE AND THE TRAVELING LIBRARY—THE BOOK WAGON SERVICE	66
Katherine Tappert, Librarian, Morristown Library, Morristown, N. J.	
CONSOLIDATION OF SCHOOLS AND PUPIL TRANSPORTATION—THE USE OF THE AUTOMOBILE IN EDUCATION	9
LeRoy A. King, Ph.D., School of Education, University of Pennsylvania	
INFLUENCE OF THE AUTOMOBILE ON THE CITY CHURCH	80
James J. Coale, Secretary, Presbytery of Baltimore, Committee on National Missions	

K ₂	WHAT THE AUTOMOBILE HAS DONE TO AND FOR THE COUNTRY CHURCH.....	83
	Warren H. Wilson, Board of National Missions of the Presbyterian Church in the U. S. A.	

PART IV. THE PLACE OF THE MOTOR IN OUR TRANSPORTATION SYSTEM

F	FUNCTION OF THE MOTOR TRUCK IN REDUCING COST AND PREVENTING CONGESTION OF FREIGHT IN RAILROAD TERMINALS.....	87
	T. C. Powell, Vice-President, Erie Railroad	
L	DISTRIBUTION OF GASOLINE AND METHODS OF PRICE CONTROL.....	89
	Huston Thompson, Washington, D. C.	
m	THE BILLBOARD AND THE PUBLIC HIGHWAYS.....	95
	J. Horace McFarland, L.H.D., President, American Civic Association	
	THE TAXICAB—ITS SERVICE AND REGULATION.....	101
	William A. Schnader, Special Deputy Attorney General, Commonwealth of Pennsylvania	
n	PUBLIC REGULATION OF MOTOR BUS SERVICE.....	107
	Delos F. Wilcox, Public Utilities Expert, Grand Rapids, Michigan	

PART V. THE BUILDING AND FINANCING OF MOTOR HIGHWAYS

O	THE HIGHWAY BUSINESS—WHAT PENNSYLVANIA IS DOING.....	115
	William H. Connell, Engineering Executive and Deputy Secretary of Highways, Commonwealth of Pennsylvania	
	HIGHWAY TRANSPORTATION.....	127
	J. Gordan McKay, Chief, Division of Highway Economics, U. S. Bureau of Public Roads	
O ₂	HIGHWAY LOCATION.....	132
	W. W. Crosby, Location Engineer, Department of Highways, Commonwealth of Pennsylvania	
	TAXATION OF MOTOR VEHICLES IN THE UNITED STATES.....	141
	James W. Follin, Research Engineer, Department of Highways, Commonwealth of Pennsylvania	
	THE FINANCING OF HIGHWAYS.....	160
	T. H. MacDonald, Chief of the Bureau of Public Roads, U. S. Department of Agriculture	

PART VI. SAFETY ON THE HIGHWAYS THROUGH TRAFFIC REGULATION

	THE STORAGE OF DEAD VEHICLES ON ROADWAYS.....	169
	William P. Eno, Chairman of the Board of Directors, Eno Foundation for Highway Traffic Regulations Inc.	
N	SAFEGUARDING TRAFFIC—A NATION'S PROBLEM—A NATION'S DUTY.....	174
	George W. Graham, Chairman of Traffic Planning and Safety Committee, National Automobile Chamber of Commerce; Vice-President, Chandler Motor Car Company	
N ₁	TRAFFIC VIOLATIONS AND THE COURT—DETROIT'S VIOLATION BUREAU...	185
	Solon E. Rose, Detroit Bureau of Governmental Research	
N ₂	THE AUTOMOBILE AND THE POLICE.....	191
	Arch Mandel, Dayton Research Association	
N ₁	PROTECTIVE MEASURES FOR THE AUTOMOBILE AND ITS OWNER.....	194
	E. Austin Baughman, Commissioner of Motor Vehicles of Maryland	

PART VII. CITY PLANS FOR MOTOR TRAFFIC

P	THE AUTOMOBILE AND COMMUNITY PLANNING.....	199
	John Ihlder, Manager, Civic Development Department, U. S. Chamber of Commerce	
P	TRAFFIC TRANSPORTATION PLANNING AND METROPOLITAN DEVELOPMENT —THE NEED OF AN ADEQUATE PROGRAM.....	205
	J. Rowland Bibbins, Consulting Engineer, Washington, D. C.	

CONTENTS

v

THE NEW YORK CITY MOTOR TRAFFIC PROBLEM.....	214
Harold M. Lewis, Executive Engineer, Regional Plan of New York and Its Environs	
THE PLAN OF CHICAGO IN 1924—WITH SPECIAL REFERENCE TO TRAFFIC PROBLEMS AND HOW THEY ARE BEING MET.....	224
E. S. Taylor, Manager, Chicago Plan Commission	
THE PLAN OF PHILADELPHIA.....	231
John Irwin Bright, Architect, Philadelphia	
PHILADELPHIA'S TRAFFIC PROBLEMS AND THEIR SOLUTION.....	235
J. Borton Weeks, President, Keystone Automobile Club	
THE TRAFFIC PROBLEMS IN DETROIT AND HOW THEY ARE MET.....	241
T. Glenn Phillips, Consultant, City Plan Commission, Detroit, Michigan	
REDUCTION OF STREET TRAFFIC CONGESTION BY PROPER STREET DESIGN—HOW ST. LOUIS IS MEETING ITS PROBLEM.....	244
Harland Bartholomew, Engineer, City Plan Commission, St. Louis	
THE TRAFFIC COMMISSION OF LOS ANGELES—ITS WORK ON THE TRAFFIC PROBLEM.....	246
Paul G. Hoffman, The Traffic Commission of the City and County of Los Angeles	
<i>PART VIII. INTERNATIONAL PROBLEMS GROWING OUT OF THE DEVELOPMENT OF THE AUTOMOBILE INDUSTRY</i>	
THE EXPORT TRADE IN AUTOMOBILES.....	251
H. H. Kelly, Acting Chief, Automotive Division, U. S. Department of Commerce	
THE RELATION OF THE AUTOMOBILE INDUSTRY TO INTERNATIONAL PROBLEMS OF OIL AND RUBBER.....	254
Harry T. Collings, Professor of Economics, University of Pennsylvania	
THE RUBBER INDUSTRY AND THE AUTOMOBILE.....	259
J. Walter Drake, Assistant Secretary of Commerce, U. S. Department of Commerce	
THE DEVELOPMENT OF THE FOREIGN OIL POLICY OF THE UNITED STATES.....	262
Henry C. Morris, Formerly, Chief of the Petroleum Division, U. S. Department of Commerce	
<i>PART IX. THE SERVICES OF AUTOMOBILE ASSOCIATIONS AND THE UNIVERSITIES</i>	
WHAT IS THE JOB OF THE TRADE ASSOCIATION?.....	264
Alfred Reeves, General Manager, National Automobile Chamber of Commerce	
SERVING THE MOTORIST—THE WORK OF THE NATIONAL MOTORISTS' ASSOCIATION.....	266
Richard H. Lee, President, National Motorists' Association	
SERVICES OF THE AMERICAN AUTOMOBILE ASSOCIATION.....	269
Ernest M. Smith, General Manager, American Automobile Association	
THE PLACE OF THE UNIVERSITY IN GOOD ROADS AND AUTOMOBILE TRANSPORTATION.....	274
Arthur H. Blanchard, Professor of Highway Engineering and Highway Transportation, University of Michigan, and President, National Highway Traffic Association	
BOOK DEPARTMENT.....	280
INDEX.....	280

1842

THE ANNALS

OF THE
AMERICAN ACADEMY OF
POLITICAL AND SOCIAL SCIENCE

The Automobile
Its Province and Problems

Publication Office
The Bradford Press, Inc.
CONCORD, N. H.

Editorial Office
215 Chestnut Street and Washington Building
PHILADELPHIA

Vol. CXVI, No. 2

VOL CXVI

NOVEMBER, 1924

No. 2

FOREWORD

THE automobile is revolutionizing American life and American industry. The gas-driven machine has brought an era as distinct and creative as that brought by steam.

In this great transport development America leads. Of the 18,000,000 automobiles and motor trucks in operation in the world now, 15,000,000 are in the United States. We make and use nine out of ten of all the motor passenger cars and trucks in the world.

American automobilists circle the round globe 20,000 times every day!

Such energy changes life. And changes it in creative ways.

We are just on the threshold of the new day. Motor use has doubled in the past five years! No other industry has ever approached such rapidity in development.

Not a phase of American life, not even her humor, has been untouched by the automobile. The home, the school, the church; recreation, production, distribution; agriculture, advertising, plant location; legislation, highway safety, the courts; city planning, public expenditures, international problems—all have felt the driving power of the automobile and the motor truck.

This volume presents the new province of the automobile and discusses pertinent problems growing out of its use. These problems vary from the purity of roadside drinking water and the plan of the home to street traffic congestion and the financing of motor highways.

As usual in such matters the solution to these problems lags behind their creation. What shall we do to insure safety? How shall the courts be so constituted as to be relieved of petty traffic violation cases? How shall the rights of the pedestrian on the highways and the automobilist in the traffic court be protected? How shall the parking problem be met? What changes in city plans should be made? How shall we finance our motor highways? How shall we keep our highways out of the greedy clutches of self-seeking politicians?

It costs money to own and run cars. It costs money to construct and maintain highways. The costs of both will continue to mount. Society gains when the net returns from both are greater than their cost.

Twenty years ago civic leaders pictured the value of good roads. The most imaginative of them never guessed at half the truth. Let us have now community surveys that will build to meet the greater industrial future just ahead. Little can we afford to block progress by blocking traffic.

Acknowledgments are particularly due to William H. Connell, Engineering Executive and Assistant Secretary of Highways of Pennsylvania, and to James W. Follin, Research Engineer of the Highway Department of Pennsylvania, for untiring assistance and helpful suggestions and advice throughout the preparation of this volume.

CLYDE L. KING.

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The Motor's Part in Transportation

By ROY D. CHAPIN

Vice-President, National Automobile Chamber of Commerce

TRANSPORTATION is the basic idea of the automobile. The man who purchases a car desires it because it will take him from one place to another place. The buyer of a truck finds use for it in carrying goods from one point to another point.

These statements are so obvious as to seem almost superfluous; but they are apparently necessary at the start of a paper on the automobile industry today, when one sees the great variety of approaches to the subject which seem to ignore the transportation thought.

THE CONSIDERATION OF MOTOR TRANSPORTATION

Most surprising is it to study catalogues of many of our large universities and note that under the heading of transportation there are many courses dealing with waterways, electric routes, particularly with the railroads, and yet in many cases there is no consideration of motor transportation.

There are in the United States today more than thirteen and a half million passenger cars and over a million and three-quarter trucks.

The various traffic surveys indicate that the average number of passengers carried daily by the automobile is about 2.5.

If we estimate the average annual mileage of an automobile as 5,000, which from the scattered record on the subject is conservative, we find that the annual passenger miles of motor travel is 168,750,000,000. When we compare this with the passenger mileage on Class I railroads in 1923, totaling 37,957,009,111, it appears that we

have before us a very considerable field for transportation study.

Probably the chief reason why only a few universities have recognized that the motor vehicle is an additional form of transportation is that the automobile has been sold chiefly to the individual.

Like the character in one of Molière's plays, who was surprised to learn that he had been talking prose all his life, the average car owner might be surprised to learn that he is in the transportation business.

He has purchased this object because it satisfies his own particular desires, and he has not stopped to realize that in the aggregate his automobile, along with the others, forms a great informal system of carriers.

With the volume of vehicles on the highways, there is coming a greater need, however, for systematizing of control, and a greater realization on the owner's part concerning his responsibility in traffic. As this sentiment develops, there will probably be an increasing public recognition of the motor car and motor truck as elements of transportation, and a growing popular interest in the subject.

MOTOR INDUSTRY AND ECONOMICS

Much of the present growth of the automobile industry may be laid first, to the fact that there existed a need for rapid, flexible individual transportation and second, to the fact that the men manufacturing the vehicles thought of their business in terms of economics. They realized that they were making rolling stock, that their product was related to other indus-

tries, that the questions of highways, taxation, road financing, and similar matters were fully as much a part of the business as the problems of production and sales.

Credit should be given to the U. S. Government, particularly to the Bureau of Public Roads, for farsighted research in motor transportation. At the same time, it is fair to note that a large part of the original research in this field has been done by the automobile industry itself, which for years past has been gathering data on the production, use and development of the automobile.

The term is appropriate, as the beginning of the industry in this country occurred virtually twenty-five years ago.

In 1899 we find the first U. S. Census reports of automobile production, the total being 3,700. Last year the output of the factories passed the four million mark.

Motor truck transportation was later in development. The first Census record here is 411 vehicles manufactured in 1904, and the total in 1923 was close to 400,000.

The following table gives a picture of the record of progress in manufacture:

ANNUAL PRODUCTION OF MOTOR VEHICLES ¹

PASSENGER CARS			MOTOR TRUCKS		
Year	Number	Wholesale Value	Year	Number	Wholesale Value
1899.....	3,700	\$4,750,000	1904.....	411	\$946,947
1904.....	21,281	23,634,367	1909.....	3,255	5,230,023
1909.....	127,731	159,918,506	1909-1910....	10,374	20,485,500
1910.....	181,000	213,000,000	1911.....	10,655	22,292,321
1911.....	199,319	240,770,000	1912.....	22,000	43,000,000
1912.....	356,000	335,000,000	1913.....	23,500	44,000,000
1913.....	461,500	399,902,000	1914.....	25,375	45,098,464
1914.....	543,679	413,859,379	1915.....	74,000	125,800,000
1915.....	818,618	565,978,950	1916.....	90,000	157,500,000
1916.....	1,493,617	797,469,353	1917.....	128,157	220,982,668
1917.....	1,740,792	1,053,505,781	1918.....	227,250	434,168,992
1918.....	926,388	801,937,925	1919.....	316,364	423,326,021
1919.....	1,657,652	1,461,785,925	1920.....	322,039	423,756,715
1920.....	1,883,158	1,809,170,963	1921.....	147,550	166,082,000
1921.....	1,514,000	1,093,918,000	1922.....	252,668	222,635,324
1922.....	2,406,396	1,567,003,041	1923.....	392,760	311,144,434
1923.....	3,694,237	1,693,808,282			

¹ From *Facts and Figures of the Automobile Industry*, 1924.

THE SILVER JUBILEE AND ITS IMPORT

We can best realize the status of the automobile industry today if we review briefly the history of its development.

The National Automobile Shows will be referred to this winter as Silver Jubilee events.

It will be noted that truck manufacture went up to a sharp peak during the war, due to the employment of these vehicles by the army, and to the acute railroad shortage.

PLACE OF THE MOTOR TRUCK

Truck development has also been more gradual, because business al-

ready had established ways of handling its shipping, had investment in these methods, and has been conservative in making changes.

The merchandising of trucks likewise has gone through several periods, as both makers and shippers have come more clearly to understand its function.

There was a time when too much was claimed for trucks by the sellers and too much expected by the buyers.

Industry in general is coming to look upon the truck as the efficient haulage unit for short distances and especially for l. c. l. shipments. In Cincinnati, for instance, eight rail lines

The motor truck is likewise coming to be regarded as the feeder and complement to rail transportation. The Long Island Railroad, for instance, has increased its annual freight business by 2,600,000 tons since 1917. During the same period motor truck use in its territory has multiplied nearly fivefold.

MOTOR BUS A RELIEF TO URBAN TRAFFIC

The percentage of total population in our cities has increased from 40 per cent in 1900 to 51.4 per cent in 1920. The numerical increase in city population during that period was 23,924,170.

The handling of this additional

ALLOCATION OF POPULATION TODAY
(1920 Census)

GROUP	NUMBER OF PLACES	POPULATION	PER CENT
Total.....		105,710,620	100.0
1,000,000 and over.....	3	10,145,532	9.6
500,000 to 1,000,000.....	9	6,223,769	5.9
400,000 to 500,000.....	4	1,710,489	1.6
300,000 to 400,000.....	5	1,721,717	1.6
200,000 to 300,000.....	12	2,921,323	2.8
100,000 to 200,000.....	35	4,706,496	4.5
50,000 to 100,000.....	76	5,265,747	5.0
25,000 to 50,000.....	143	5,075,041	4.8
15,000 to 25,000.....	200	3,798,325	3.6
10,000 to 15,000.....	259	3,144,417	3.0
5,000 to 10,000.....	721	4,997,794	4.7
2,500 to 5,000.....	1,321	4,596,473	4.3
Rural (under 2,500).....		51,403,497	48.6

have combined to have their transshipment business handled by motor trucking.

More than 150 railroads are using motor units on their short lines. Some are operating these over the tracks through the employment of flanged wheels. Others are abandoning the short rail routes entirely. The Pennsylvania Railroad, for instance, is employing eleven motor truck units over short routes.

traffic has created very grave difficulties for the transit companies and accompanying discomfort for the population. The motor car and the motor bus have helped materially to relieve this situation.

The pressure of population demands has created a vast suburban development, which is served by (a) buses, (b) steam and electric railroads, plus motor cars, and (c) private motor cars on door-to-door service.

For a long while the electric railroads, alarmed by the competition of the motor bus, seeing it entering outlying districts before rail lines could be laid, and knowing that the public was willing to pay twice the street car fare for buses on the city routes, tried to place every obstacle in the way of this vehicle.

It became increasingly clear, however, that the public wanted bus transportation.

In recent years the electric roads have grasped this fact and now 134 electric railways are operating motor bus lines. In some cases they are additions to the rail equipment and elsewhere they have replaced it.

There are likewise a large number of independent companies. Also, the interurban bus business has become very popular, both in competition with existing trolley routes, and in establishing lines where there was not enough travel to support trolleys.

THE TAXICAB IN EARLY STAGES

Taxicab travel is likewise a new phase of the automobile industry. The old-style unregulated cab proved unsatisfactory, high-priced and irresponsible. Today, however, most cities have cab companies organized on a business basis. The question of what constitutes a profitable and reasonable price still seems to be a subject of considerable agitation. Some hold the view that the present size of the cab is uneconomic. One or two passengers is the usual cab load and many are prophesying that future cabs will be smaller and lighter.

RELATING AMERICAN INSTINCTS TO MOTOR GROWTHS

I do not think we can understand the economics of automobile travel or the growth of the automobile industry

without a realization of American instincts.

I have noted the status of the truck, the bus and the cab because they are part of the subject and because they are more obviously within the study of transportation, but the reason for their growth is less insistent than the basic appeal of the private car. Americans are a race of independent people, even though they submit at times to a good deal of regulation and officialdom.

Their ancestors came to this country for the sake of freedom and adventure. The automobile satisfies these instincts. The owner of a car can travel in any direction he desires and at any time. The complications of civilization probably make it necessary for the average citizen to be hedged about in most of his activities by definite working hours, conditions, places of residence, and other factors making for an ordered existence. The automobile supplies a feeling of escape from this suppression of the individual. That is why the American public has seized upon motor travel so rapidly and with such intensity. Broadly speaking, the automobile is in this way supplying an economic service. Independence is a value, even though not readily measured.

The public has found further values in the car in the more narrowly defined money-making sense. Cars permit one to live in communities where rents are lower, to save time in hundreds of types of business, to enjoy vacations at low cost, and in many other ways enable a large proportion of motor users to get back part of, or all of, or a surplus over, their investment.

The public purse could not sustain the annual investment of \$2,000,000,000 in new vehicles, with perhaps several billion more in maintenance, operation and overhead, if there were not a large profitable element in this form of

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transportation, but I believe the impelling motive which has built up this demand has been the American craving for freedom of the individual.

WHAT IS THE MAXIMUM?

The U. S. Bureau of Public Roads gives the following figures of motor vehicle registration for the past ten years:

REGISTRATION OF MOTOR VEHICLES IN UNITED STATES

YEAR	REGISTRATION	PER CENT GAIN OVER PRECEDING YEAR
1914.....	1,711,339	36%
1915.....	2,445,666	43%
1916.....	3,512,996	43%
1917.....	4,988,340	42%
1918.....	6,146,617	23%
1919.....	7,565,466	23%
1920.....	9,231,941	22%
1921.....	10,463,295	13%
1922.....	12,238,375	17%
1923.....	15,092,177	23%

There is now an average of one vehicle to every seven persons in the country.

This, of course, is a statistical, not an actual, representation. It does not mean that every seventh person owns a motor car. There are in the 1923 figure 1,627,000 commercial vehicles. There are nearly three-quarters of a million passenger cars owned by business corporations. There are probably several hundred thousand families owning two or more automobiles.

Nevertheless, the proportion of cars to population is very high. The question arises—"Have we come to the end of the increase in this country?" In the sense that this question means whether or not we have reached the end of the unfilled basic market at this particular moment, whether a fifteen or sixteen million registration is the

total absorbable number of motor vehicles in 1924, the answer is hard to determine.

This country will increase yearly in wealth and population. The trend of our cities is towards further suburban development, calling for more individual transportation. These elemental factors in the situation mean that we may look for an indefinite gain in motor vehicle registration, not perhaps at the same percentage rate as in the past, but nevertheless a constant growth.

SIGNIFICANCE OF THE \$200 CAR

The automobile industry today is founded upon the \$200 car.

Many, who wonder how there can be the wide distribution of automobiles that exists, would concede that there is an enormous, virtually limitless, field for the \$200 and \$100 automobile, now being supplied by the used vehicle.

That automobile is today the basis of our large market and the chief reason for our expectation that increases in wealth will be promptly reflected in growing registrations. The statement that, in 1923, 2,750,000 more persons owned motor vehicles than in 1922, does not mean that that number of new owners purchased cars at the retail price. It may mean that that total, or a large proportion of it, bought used cars; and that the previous owners of these used cars, being in the higher income ranges, bought the newer vehicles.

There were 4,000,000 motor vehicles purchased last year. Perhaps a million of these replaced worn-out cars and a very large proportion of the remainder involved trade-ins, which meant a tremendous sale, perhaps 2,000,000 or more, of used cars. Where there is a trade-in, the buyer of the new vehicle, of course, does not pay the full retail price in cash by a considerable amount.

Hundreds of thousands of the cheaper grades of used cars are sold for almost nominal amounts.

According to the figures of the National Bureau of Economic Research the number of automobile owners in the country is roughly equal to the number of persons receiving incomes in excess of \$1,400. Between the \$1,000 and \$1,400 income classes there are approximately 12,000,000 persons. As their wealth increases, as they move into the suburbs, or as factories employing them are transferred into outlying districts where rents are lower, an immediate vast market for used cars is created, which in turn brings about demand all the way up the line.

AUTOMOBILE'S EFFECT ON OTHER BUSINESS

I have tried to sketch the underlying factors in the economic position of the automobile industry in the United States today. The possibilities of new markets, the demand for cars in the rest of the world, which now has but 17 per cent of the total motor vehicle registration, the further adaptation of the motor car in a variety of businesses

are too extensive to discuss in this limited space.

It is essential, however, to consider what relation the growth of the automobile industry has had to some of the other major businesses. Has the money spent for motor vehicles been diverted from other possible markets? Some seem to feel that it has and perhaps this has been the case in specific instances. We cannot measure this definitely, however, because most of the wealth involved may have been created by the vehicle itself in the saving of time. Further, it is possible that the individual exerted himself to a greater degree in order to purchase an automobile.

In short, without the automobile there may well have been less development of the country and lower productivity, rather than that number of dollars available for something else. Undoubtedly, specific railroad and electric lines have suffered severe competition from the motor vehicle. In such cases the public apparently decided that motor transportation was the more satisfactory.

This form of travel has, however,

RAIL LINES AND MOTOR DEVELOP SUBURBS*

(The following table shows the steady increase in both motor and rail travel in Long Island, a suburban district of New York City. The motor vehicle registrations and new dwellings figures are for those counties on the island not within the city limits.)

	PASSENGERS CARRIED BY LONG ISLAND R. R. SYSTEM	MOTOR CARS REGISTERED†	FREIGHT TONNAGE CARRIED BY L. I. R. R.	MOTOR TRUCKS REGISTERED†	NEW DWELLINGS CON- STRUCTED
1917.....	50,796,028	11,829	5,271,509	2,482	3,863
1918.....	55,486,000	19,710	5,798,876	3,834	1,153
1919.....	64,067,541	24,309	6,916,886	4,574	7,911
1920.....	72,743,820	24,709	5,886,969	5,430	7,531
1921.....	75,506,045	32,360	5,572,679	7,566	16,197
1922.....	79,656,891	41,111	6,028,003	10,245	23,336
1923.....	86,194,439	51,673	7,917,977	11,176	31,699

* From *Facts and Figures of the Automobile Industry*, 1924.

† For area not in Greater New York.

been by no means entirely competitive. The Long Island Railroad, for instance, is today handling a maximum of passenger traffic in a suburban vicinity where motor registration has increased very rapidly. The car and the truck may be regarded as very effective complements to the railroad in most suburban sections, as they permit radial development around the railroad station.

In fact, as the gridiron of steel tracks developed this country along their borders, so we may look for an intensive outlying growth as the pressure of population makes it necessary.

As a shipper, the automobile business is one of the railroads best customers. It ranks third among manufactured articles. We find petroleum and its products, which is to a large degree a part of the automobile business, is first. The table below indicates the situation:

MOTOR INDUSTRY THIRD LARGEST RAILROAD SHIPPER OF MANUFACTURED ARTICLES IN 1923
(Figures from Interstate Commerce Commission)

	CARLOADS		CARLOADS
1. Refined petroleum and its products	1,306,390	7. Iron, pig and bloom	309,145
2. Bar and sheet iron, structural iron, and iron pipe	915,392	8. Castings, machinery and boilers	290,800
3. Automobiles, trucks and parts	797,307	9. Chemicals and explosives	289,815
4. Cement	552,987	10. Lime and plaster	231,415
5. Brick and artificial stone	532,613	11. Ice	198,052
6. Fertilizers (all kinds)	328,051	12. Agricultural implements and vehicles other than automobiles	177,438

The automobile, presumably, has not added to the actual amount of food purchased. It has, however, been seized upon by the farming element for its time-saving and social advantages. It enables the farmer to get to market more quickly, to have a wider range of markets, and to take advantage of the best prices. There are 4,500,000 cars and trucks owned by farmers.

The degree to which the automobile industry has supplied a market for raw materials is best indicated by Table I on following page.

The manufacture of cars and trucks, together with all the workers in related employments, has a very considerable effect on labor demand. The extent of this demand may also best be indicated by the statistical method as shown in Table II on following page.

IN CONCLUSION

How much the automobile is a result of, or creator of, general prosperity it is difficult to determine. It is, at any rate, interesting to note that the investment by the public in motor vehicles has been accompanied in the past few years by a continual upward trend in various forms of savings. Assets of building and loan associations have tripled, life insurance is more than two and a half times as great, savings bank deposits are nearly double, total individual bank deposits are

more than twice what they were in 1913.

In conclusion, may I revert to the initial statement that the automobile is a phase of transportation. I have not touched upon the subject of road development, financing and other matters which are pertinent, but are being covered elsewhere in this volume.

A scientific study of the automobile industry will, however, always take these factors into consideration.

Here exists a vast and valuable field for economic research.

TABLE I—RAW MATERIALS USED IN MANUFACTURING MOTOR VEHICLES DURING 1923*

	AMOUNT USED IN MOTOR VEHICLE MANUFACTURING AND PER CENT OF TOTAL PRODUCTION OF MATERIAL
Iron and steel (tons)	3,434,800
Per cent of finished rolled steel and iron output used in mfg. cars and trucks	10.2%
Copper (pounds)	121,949,150
Per cent	9.3%
Aluminum (pounds)	91,514,000
Plate glass (square feet)	47,229,500
Per cent	53%
Upholstery leather (square feet)	60,000,000
Per cent	69%
Asbestos (feet)	60,000,000
Rubber (pounds)	547,468,544
Per cent	80%
Hair and padding (pounds)	40,870,000
Lumber, hardwoods (board feet)	1,163,232,000
Per cent	14%
Top and side curtain material (yards)	30,389,000
Lumber, soft wood, crating for railroad shipments and ex- ports	300,121,000
Upholstery cloth (yards)	19,036,000
Lead (pounds)	135,349,000
Per cent	12%
Tin (tons)	7,300
Per cent	10%
Nickel (pounds)	6,275,000
Paint and varnish (gallons)	14,304,500
Imitation leather (square feet)	166,319,000

* From *Facts and Figures of the Automobile Industry, 1924.*

TABLE II—3,105,350 PERSONS EMPLOYED IN THE AUTOMOBILE INDUSTRY*

EMPLOYED DIRECTLY		EMPLOYED INDIRECTLY	
Motor vehicle factory workers . . .	318,100	Iron and steel workers	62,000
Parts and accessory factory work- ers	300,000	Copper, lead, tin, nickel and alum- inum workers	13,000
Tire factory workers	114,750	Railroad workers	80,000
Motor vehicle dealers and sales- men	181,000	Plate glass workers	12,000
Supplies, accessories and parts, deal- ers and salesmen	135,000	Tannery and leather workers	10,000
Garage employes	110,000	Woodworkers	25,000
Tire dealers and salesmen	90,000	Upholstering cloth, top and side curtain material workers	20,000
Repair shop employes	345,000	Asbestos workers	500
Professional chauffeurs	470,000	Paint and varnish factory work- ers	1,000
Professional truck drivers	750,000	Coal miners	2,500
Gasoline refinery and oil workers . .	60,000		
Automobile financing and insur- ance	5,500	Total indirectly employed	226,000
Total directly employed	2,879,350	Grand Total	3,105,350

The figures for the various industries are based on the per cent of total output of product consumed by automobile industry. No estimates attempted for the number of people working on curled hair and other forms of padding, road construction work, manufacturing of machine tools and other production equipment, extension of automobile plants, etc.

* From *Facts and Figures of the Automobile Industry, 1924.*

The Automobile and Allied Trades and Industries

By ALFRED H. SWAYNE

Vice-President, General Motors' Corporation; Director, National Automobile Chamber of Commerce

IN the short space of two decades, the automobile has developed new world markets for practically all of the basic raw materials entering into trade and commerce.

So far-flung are the trade relations of the motor vehicle industry that only an exhaustive research would reveal all of them. One could set forth on a journey from Detroit—visiting all the principal ports and manufacturing centers of the world—and find in each its contribution toward meeting the universal demand for individual transportation. Rubber from India, Sumatra, Ceylon, Java and the Malay Peninsula; cotton from the banks of the Nile; aluminum from the bauxite ores of France, Germany, Dutch Guinea, and aluminum metal from France, Norway, England, Switzerland and Canada; and copper from Mexico and Chile but serve to illustrate the automobile's widespread participation in world commerce.

ACTIVITIES INCIDENT TO MOTOR'S ADVENT

The direct influence of the industry is shown by the fact that in 1923, twenty-nine states of the Union and the District of Columbia had a part in motor vehicle manufacturing.

Three hundred and fifty-one factories are reported—Michigan heading the list with fifty-four of them.

More than 318,000 wage-earners were directly employed in the manufacture of vehicles in 1923, and indi-

rectly 3,105,000 wage-earners received some of the automobile manufacturing dollars which went into circulation in payment for men and materials.

Production of motor cars and trucks reached a total wholesale value exceeding two billion dollars, a transportation investment of great economic importance.

Almost as great in extent are those industries and activities arising from the development and use of the motor vehicle. First among these is the nation's highway-building program. Since the early days of this new transportation there has been an incessant and ever-increasing demand for better roads on which to operate the automobile. Each year has seen a rise in the magnitude of road-building operations, threatening to rival in scale the automobile industry itself. Somehow never able to keep pace with the demand, the present cost of our national program of construction and maintenance for rural highways amounts to approximately \$1,000,000,000 a year.

Borne on the crest of this wave, the road machinery industry has had a tremendous impetus since the war, when we settled down to road construction in earnest. Half the asphalt and 20 per cent of the country's cement output are today going into the highways.

Many states have a highway plant with the number of employes running into five figures and annual financial programs of many millions. This activity is adding not alone to the prosperity of the state or locality

directly engaged in the work, but to that of the entire nation.

In the transportation field, the automobile industry is the third best manufacturing customer of the railroads, closely allied industries occupying first and second place.

The waterways took 80,000 cars on the way to their destination. More than \$142,000,000 was derived by the rail lines in revenue from the transportation of the completed vehicles, not to mention the coal used in their manufacture, the movement of parts and raw material such as lumber and steel, and machinery. Shipping all these passenger cars and trucks at one time in 100 car trains would have taken 6,500 miles of track. It would have made up two trains passing through Chicago and reaching the four corners of the country. The engine of the first train would be in Seattle, Washington, at the time the caboose was leaving Jacksonville, Florida, while the engine of the other train would be in Boston at the time the caboose was leaving Los Angeles, California.

First on the railroad's list of customers among manufacturers are refined petroleum and its products. Of the 6,685,035,280 gallons of gasoline consumed in the United States during last year, 85 per cent was used in motor cars and trucks, every vehicle running using an average of more than $1\frac{1}{4}$ gallons a day or an average of 450 gallons for the year.

Second on the list are the steel and iron people. More than 10 per cent of their products are utilized in the production of motor vehicles, either in construction of the car itself or in parts and accessories utilized later on. W. C. Hirsch, writing in *Automotive Industries*, predicts that new motor car and replacement requirements will equal, if not exceed, the de-

mand of the railroads on the steel industry for passenger and freight car materials.

Paralleling, of necessity, the growth of motor vehicle manufacturing has been the growth of the tire industry, now utilizing 80 per cent of the country's crude rubber supply. New sources nearer fabrication are being sought and governmental surveys as to production possibilities are being made.

According to the 1923 survey of manufactures of the Bureau of the Census, 160 establishments are engaged in the manufacture of tires and inner tubes, while a total of 528 are engaged in the manufacture of rubber products. Ohio leads the list with 105 of these factories, closely followed by Massachusetts and New Jersey and 26 other states scattered from the Atlantic to the Pacific. In 1923 nearly 100,000 persons were directly employed by these 160 plants.

Coal miners came in for a share of the automobile dollars when they mined the 1,478,261 tons of coal used in the manufacture of tires, and in the mining of another million and three-quarters tons consumed by the automobile factories.

Along in 1920, closed automobiles came very largely into favor and, as a result, the plate glass industry felt a tremendous urge to increased production. Today 53 per cent of its output goes into windshields and into the manufacture of closed cars, which are now exceeding 35 per cent of the total of cars produced.

Mexico and Chile, our neighbors to the south, as well as Arizona and Colorado nearer home, send us copper, more than 9 per cent of which goes into the finished vehicles, along with 91,000,000 pounds of aluminum, some of

which crosses the ocean from France, Germany and Dutch Guinea.

The Joplin district of Missouri furnishes zinc and lead for batteries and similar uses, which took 12 per cent of the supply.

The slaughtering and meat packing industry sells 69 per cent of the upholstery leather supply to motor manufacturers, who also use 166,000,-000 square feet of imitation leather; in addition, 19,000,000 yards of upholstery cloth and 20,000 tons of hair and padding enhance the facility of riding comfort.

Paint and varnish to the extent of 14,000,000 gallons adds to the attractiveness and durability of the vehicles and to milady's pride in her car.

Asbestos from Canada is turned by American factories into brake linings for motor cars and motor trucks.

Hardwood lumber from the Northwest for floor boards, bodies, wheels and other uses took up 14 per cent of this supply, while nearly a third as much soft wood lumber is utilized for crating railroad shipments and for export.

Three thousand tons of nickel embellishes the radiators, lights and horns, while 10 per cent of the country's tin supply is bought by the automobile makers.

A separate function in itself, the distribution and servicing of the 15,500,-000 motor vehicles now in operation, has brought into existence an ever-increasing number of establishments which cater to the convenience and comfort of the motor vehicle user. Nearly 90,000 of these places of business are in operation in the United States and 2,500 in Canada.

The Chilton Trade Directory List, as

of September, 1923, shows the following classification with considerable natural duplication of functions:

Charging stations.....	4,510
Exclusive passenger car dealers.....	19,247
Garages.....	52,599
Repair shops and service stations.....	69,689
Supplies.....	68,003
Exclusive truck dealers.....	2,414
Passenger car and truck dealers.....	23,585
Ford dealers.....	10,403

The multiplicity of functions of many of these accounts for large individual groupings; yet the total is smaller by reason of the fact that a single garage or service station may render several types of service.

Not all the gasoline is consumed by privately-owned passenger cars and trucks. More than 80,000 taxicabs travel from 60,000,000 to 70,000,-000 miles a year, constituting quite an industry by themselves.

Then there are the terminal motor truck companies; the bus companies like the Fifth Avenue Bus Company, the Detroit Motor Bus Company, and thousands of independent bus lines operated in all parts of the country. The busses and trucks operated by the trolleys, steam railroads and waterways are contributing both to the upbuilding of national transportation and to the growth of the oil industry.

Calling the roll state by state, each responds with its part in the industry from New England's textiles to Pennsylvania's coal; Colorado and Arizona with copper; Missouri with zinc and lead; the Northwest with lumber and the South with cotton, each important to the making of the vehicle. At the same time, each plays an important rôle in the distribution and utilization of the finished product.

If we trace the influence of the industry still further, we will find it an indis-

pensable part of the retail field. To its line of purchases the drygoods store now adds motoring accessories, sport clothes, blankets and other apparel necessary to passenger car use. Hardware stores carry flash lights and tools. Banks issue special checks for tourists. Hotels find a new and profitable business in the motor traveler. The farmer sets up wayside markets to reach the city dweller. A parts and accessory business with a turnover in excess of a billion and three quarters enters into the reckoning. And so on through the entire list of trades and occupations.

Then too, great additional stimulus

has arisen from the search for substitutes; for new sources of raw materials; in the refinement of methods and development of by-products. A particularly noticeable instance is gasoline which was formerly the by-product of petroleum, while kerosene was the mainstay. The motor vehicle reversed their positions, and built a far greater industry out of the formerly unimportant product. Countless similar situations might be added by a detailed and careful analysis, all weaving closer and closer the vital and mutually advantageous relationship of the automobile and allied trades and industries.

The Automobile and American Agriculture

BY JOHN M. MCKEE

Deputy Secretary of Agriculture, Commonwealth of Pennsylvania

THE number of motor vehicles on the 6,500,000 farms in the United States is estimated at 4,200,000 automobiles, 370,000 trucks, and 450,000 tractors.¹ This stupendous total of potential power for transportation to market, to church or to school, as well as for other work and for recreation, has been almost wholly developed within the last fifteen years and chiefly during the last decade. In fact, the number of automobiles and trucks has doubled since 1919. Approximately one-third of all automobiles in the United States are now owned by farmers.

MOTOR VEHICLES REVOLUTIONIZE TRANSPORTATION

In this short period of time the method of travel and hauling, which

had obtained for many decades (by horse and buggy or wagon chiefly), has been completely revolutionized. There has not yet been time to adjust our social, religious, educational or economic institutions and agencies to this new era in motive power, which breaks down all the old barriers of time and distance against which the farmer has struggled. While our social and economic institutions are in this stage of adjustment, it is difficult to evaluate the significance of motor vehicles in agriculture. An inquiry to agricultural colleges and state departments of agriculture brought forth very few definite facts as to the effects of the automobile upon agriculture. All see a great transformation taking place, but it has not yet been possible to more than speculate as to results.

The fact that approximately 7 per

¹ Estimate by U. S. Department of Agriculture, Bureau of Public Roads.

cent of farms have tractors, 6 per cent trucks and 65 per cent automobiles, is significant and is an indication of the dominant motive back of the purchase of cars by farmers.

FARM HOME AND COMMUNITY LIFE ENRICHED BY AUTOMOBILE

An eminent agricultural leader has wisely said, "The chief function of the farm is as a home." It is to the making of this home more enjoyable and more worth while that the automobile owes its greatest popularity and takes its place in the front rank as a contributor to the farm home, better communities and a more sound social and economic structure.

While American farm life has had much that is good and has contributed richly to its people, yet it has been grievously handicapped in many ways by the limitations of time and distance, growing out of its restricted transportation for decades previous to the advent of the automobile.

One needs to have lived in the open country to appreciate the change from the old to the new conditions. Formerly, the marketing of eggs and butter and the purchasing of household necessities was commonly done at the nearest country store, regardless of the possible low prices offered for farm produce or the poor assortment from which to purchase household needs. A trip to the county seat was a rarity occasioned by the need to pay taxes or outfit the children for school. A journey to a nearby county to inspect improved farm methods, to attend a sale of pure bred livestock or to enjoy recreational opportunities was only for a limited number. Social contacts were few and commonly limited within a radius of a few miles; the educational facilities were meager and the opportunity to bargain in the sale of farm

products or the purchase of supplies was almost absent. All this has been revolutionized by motor vehicles.

Trips which formerly required a period of several hours, oftentimes accompanied by exposure to rain or storm, are now made in a much shorter period, in comfort and in cleanliness, protected from the weather. (This ease and comfort in travel is a haven that is already working fundamental social and economic changes, which will be reflected in the life of the family, the community, the church, school, grange and business centers.)

Freedom from the limitations of time and distance, which the automobile has brought to the farm family, will probably play a greater part than any other single factor in making for a satisfied farm family. True it is that it makes the city or town readily accessible to those who do not like the farm. It is well that such should have an opportunity to follow other vocations. This will mean that those who remain are there because they have seen other conditions and have decided in favor of the farm, in which the farm home and farm work are so inseparable. It is bringing within easy reach of the homes the best that the city has to offer in the way of entertainment, educational opportunity, shopping facilities, etc., without losing the many good things of the farm. Coupled with this greater freedom and a satisfied state of mind goes a better health service, both in the form of timeliness of the treatment and the accessibility of specialists in different lines. Better farming is inevitable from the ease with which the family may go out and see improved methods in farm operation or the results of improved livestock in their own or neighboring counties. Religious and social sides of farm life also take on a brighter view.

This reduction in time and distance

for travel inevitably means larger centers for community activity. It is going to challenge the attention of the rural leaders of our religious, educational and social institutions to find the best methods by which to adjust their primary group, such as the church, school or grange, serving the smaller community, to this new condition. Formerly the grange provided that the subordinate granges should not be closer than two miles to one another. While there was no provision as to the distance of schools and churches, it is common knowledge that in the more densely populated sections they are found based on the distance that the child can walk to school or Sunday school. It seems inevitable that such institutions must adjust themselves on a basis of larger centers.

Rural life studies have shown that every community should recognize six essential services to be made available to its people. These are: the economic, including merchandising, marketing and financing; educational; religious; social; communication; and organization.²

The automobile and truck are certainly contributing greatly to the creation of centers large enough to provide all of these services.

AUTOMOBILE A FARM BUSINESS ASSET

Most discussion on motor vehicles thus far has dealt with their economic importance. All phases of life on the farm are so intimately associated that it is difficult to isolate any one feature. While not its greatest contribution to farm life, there is no question but that the automobile renders a real economic service.

That reducing the time and extending the scope of travel results in a

greater outlet for farm products is commonly found. The farmer is meeting more people, knows the markets and prices better and is therefore in position to sell to greater advantage. The same advantages hold true in the purchase of farm supplies, implements, repairs, etc., in the way of gaining lower prices, having a greater selection from which to choose and securing emergency repairs quickly.

The farmer is learning how to take advantage of the services of his bank. He meets his banker oftener and counsels with him on business problems and investments. In the past, farmers constituted one of the best fields for fake schemes, with the result that they have been fleeced out of life-time savings.

With the scarcity of farm labor and high prices, the saving of time is increasingly important. Ofttimes the wife or daughter finds it pleasant to run into town to take care of errands, saving the time of the man and breaking the monotony of the strenuous work in the farm household. Estimates of the average annual cost of operating farm automobiles range from \$200 to \$300, of which from \$50 to \$100 a year should be charged to pleasure and the balance directly to farm business. This charge is not particularly high when one considers that the majority of the farm automobiles are touring cars, five passenger or larger, being equivalent to a two-horse conveyance. They have in a great many cases replaced the driving horse, so that the expense of the car is not all additional cost. A portion of this, if the car were not owned, would be expended on the keep of horses. The horse, of course, would be consuming the farmer's own product (the grain or hay which he grows), whereas the car requires a cash purchase. In most cases the farmer will arrange to feed his hay and grain

² "Service Relations to Town and Country." Research Bulletin No. 58. University of Wisconsin.

to some other livestock which will probably make him a better return than the driving horse. There is no doubt that the use of motive power vehicles has tremendously reduced the demand that otherwise would have existed for farm grains and roughage. This is being overcome by a greater expansion of other lines of the livestock industry to profitably consume the feed of the replaced horse.

VALUE AND USE OF TRUCK

Only about 6 per cent of the farms have trucks, but this does not represent the extent to which the truck is of service to the farmer. There is a very extensive development of truck routes not owned by farmers, but which conduct a commercial hauling service. One large dairy organization reports 250 truck routes in operation, the majority of which take the milk direct from the farm or from a nearby loading platform.

Farms using trucks are usually the larger ones, those more removed from markets, particularly truck farms. Studies indicate that the distance to market is on an average of eight miles for all farms, twelve miles for truck farms, and six miles for dairy farms.³

Preference for the one-ton truck far exceeds all others, amounting to 60 per cent of all. The trend is for larger trucks, those above one ton rather than less than one ton.

Time required for hauling over different distances by the truck has been found to be about one-third of that required by wagon, the variation being somewhat greater as length of trips increases.

To this time-saving feature 90 per cent of the farmers attribute the chief

value of the truck. This may also apply to the saving of hired help (78 per cent reported a saving in number of hired help required), and also a reduction in the number of horses, particularly on the larger farms. Of the truck operators, 42 per cent reported reduction in number of horses, amounting to approximately one horse per truck.

The estimated annual cost of operating farm trucks, exclusive of depreciation, is \$244 for 1920 and \$155 for 1923.⁴

Probably no single farm operation uses the truck so extensively as the hauling of milk. This is because trucks operate every day over definite routes. Reports from leading dairy states indicate that the amount of milk delivered by automobile truck to receiving stations or distributors ranges from 20 to 95 per cent, averaging around 75 per cent. Milk was delivered to receiving stations or to distributors by motor truck to the following cities in the per cent shown:

	Per cent
Baltimore.....	45
Philadelphia.....	20
Cincinnati.....	97
Detroit.....	88
Milwaukee.....	87
St. Paul, Minneapolis, Indianapolis (each).....	94 ⁵

The rate is usually about the same as that of the railroad, running from 1½ cents to 3 cents per gallon, usually in ten-gallon cans. The routes commonly run from twenty to forty-five miles in length, with many extending a greater distance. Of course the trucks of larger capacity are used on larger routes. Loads of 100 ten-gallon cans are common. In most cases the trucks operate throughout the entire

³ U. S. Department of Agriculture Bulletin 1201—Motor Trucks on Eastern Farms.

U. S. Department of Agriculture Bulletin 1814—Motor Trucks on Corn Belt Farms.

⁴ U. S. Department of Agriculture. Bureau of Public Roads.

⁵ U. S. Department of Agriculture. Bureau of Public Roads.

year. The return of the empty milk cans is included in the per gallon charge.

As the methods of handling milk are being perfected, it is found that fewer cans are required and the loss of cans per year is decidedly less by truck. A recent development is that of the glass-lined tank truck on a three to five ton chassis. These are used for transportation between the receiving station and the distributing center and are not being used for collection from farm to farm as yet.

In addition to the feature of actually transporting the milk, the truck opens up a new territory within a radius of fifty to seventy-five miles of consuming centers and offers to the farmers thus served a ready market for a major farm enterprise.

The quantity of farm products being transported to the market or receiving station is surprisingly large. Reports from twenty-four states indicate that milk, butter, eggs, fruit, potatoes and hogs are being delivered in quantities ranging from 10 to 95 per cent.

Connecticut reports an estimate of 90 per cent of all farm products being delivered by truck, and California, 75 per cent.

The truck has increased in importance as a carrier of livestock within a range of seventy-five miles of market centers. One day one-ninth of all the sheep arriving at the Kansas City yards came by auto truck. The truck has won particular favor as a medium for transporting hogs. This is done with less loss of animals and eliminates cartage or hauling to shipping stations and permits the shipping of less than carload lots when hogs are in prime market condition. Within a fifty-mile zone around Indianapolis, 90 per cent of the hogs are hauled by truck.⁶

⁶ Robert E. Browne. U. S. Bureau of Public Roads. August, 1924, issue of *Public Roads*.

The return trip carries chiefly four kinds of loads: (1) Feeder animals for the farms; (2) Farm supplies, feed, fertilizer, etc.; (3) Merchandise; (4) Manure.

MOTIVE POWER REDUCES LOCAL TRANSPORTATION COSTS

Studies by the Bureau of Crop Estimates of the Department of Agriculture in 1918 show that the estimated cost for hauling in wagons from farms to shipping points averaged about 30 cents per ton mile for wheat, 33 cents for corn, and 48 cents for cotton; for hauling in motor trucks or by tractors the averages are 15 cents for wheat and corn and 18 cents per ton mile for cotton. While most of this hauling is done by the farmers themselves, the costs are based largely upon the usual charge in the various counties for hiring vehicles by the day.

The second report shows that 33 per cent of those who answered the Department's questionnaire had changed from a poorer to a better market as the result of truck purchase, with an increase in the average distance to market from eight miles before the change to sixteen miles afterwards. Before the purchase, 73 per cent were using markets less than 10 miles distant; now 64 per cent go to markets ten miles or more from their farms and about one-fourth go to markets more than twenty miles away. Incidentally, it is interesting to note that 92 per cent of those who were using trucks in 1919 still use them, and of the remainder half have purchased new trucks to replace the old.⁷

The cost of local transportation, getting products to the assembling station or nearby consumers, has been out of all proportion to long haul costs in the past. Government studies have shown that local transportation absorbed more than 5 per cent of the total value of goods transported, while the long haul of the railroads amounted to about 6 per cent. The automobile

⁷ A. J. Brosseau, National Automobile Chamber of Commerce Publication entitled, "Highway Transportation and the Farmer."

or the truck offers a means of reducing these haul costs.

TRUCK SERVICE TIMELY

With many farm products the question of timeliness is fully as important as the rate charges and in this field the truck is preëminent for hauls up to 100 miles. This feature applies to a great majority of farm products, such as livestock, preventing shrinkage and loss by death; such as milk, making it possible to maintain the right temperature which results in high quality; and such as vegetables, making it possible to get to the market with the produce fresh and at a favorable time for sale.

In every case the delivery time by truck was less than by rail. Where a carload or less than a carload shipment took twenty-eight hours by rail to Springfield, forty-four miles away, a three-and-one-half-ton truck did the job in four hours and a smaller truck more quickly. The distance to Boston (112 miles) was covered in twelve hours by a three-and-one-half-ton truck, sixteen hours by a five-ton truck and required thirty-two or fifty hours by rail depending upon the class of shipment.

Probably most farmers will be benefited by the service of the motor route coming by their door, taking their products, and delivering them to markets or shipping points, so that the farmer is left free to remain on the farm and direct operations there; for he is essentially a producer rather than a transporter or marketer. This service will result in more farm products being produced and much being marketed that in the past has been largely permitted to go to waste. In the end both the consumer and farmer will be benefited by the service this intermediate agent in transportation can render.

MIGRATION TO CITY CHECKED

Much has been written about the danger of migration from the farm. This movement has had two impelling motives: First, an economic one, reflecting the disparity in returns between farm work and industrial labor; second, the dissatisfaction coming from the limitations of farm life. While the rewards of the farmer are not all measured on an economic scale, adequate financial return is essential in order that the farm may favorably fill its chief function as a home. This return is necessary in order to provide modern conveniences for a satisfactory standard of living. There remains to be supplied, however, the social, cultural and religious opportunities of life, which have taken many from the farm. In addition to its economic contribution, the automobile brings the few remaining attractions of the city within such easy reach of the farm family that all incentive to migrate city-ward will soon be gone.

Given a reasonably fair economic equilibrium between the income on the farm and in the city, it can safely be predicted that the automobile with improved roads will place the farm family, located in the open country in the midst of a heritage of broad acres and surrounded by improved crops and livestock, in an enviable position. Those remaining on the farm will be there because they realize that this is where they can live the most complete and satisfactory life. This feeling comes largely because the automobile brings freedom of travel and a reduction of time and distance which are important factors in making farm life more worth while.

The Motor's Part in Public Health

By JOHN C. LONG

Manager, Educational Department, National Automobile Chamber of Commerce

PONCE DE LEON tried to find the fountain of youth; and thus established himself as perhaps the most quixotic man in history.

The Greeks consulted oracles, Macbeth placed himself in the hands of witches, and the modern business man gazes hopefully upon charts and statistics.

All this is a preface to saying that no panacea is complete and that most silver linings have their dark clouds.

Accordingly, the statement that the automobile is a great contribution to public health, while true, is subject to limitations.

While setting forth here some of the ways in which the motor vehicle has contributed to physical well-being, it is pertinent to note that the advent of the car is simply one of the many phenomena that have been working in that direction.

It may be assumed that the reader is somewhat familiar with the progress of modern sanitation and with health education. He will not, then, make the mistake of thinking that this paper is presenting the automobile as a cure-all. It is not a panacea, but a tonic, nor is it the kind of tonic which leaves a bad taste the morning after, unless taken in excessive doses.

Perhaps, however, it is well to list the harmful effects first. One must note the tragic record of automobile fatalities and injuries, amounting to 16,000 of the former and several hundred thousand of the latter during the past year. This is a serious hazard which must be dealt with. What can be done to meet this situation is discussed elsewhere in this volume. The

most hopeful aspect of the case is that these disasters very largely can be prevented.

It is also possible that the prevalence of automobiles has been responsible for some decline in walking as well as in bicycle riding. Where this decline has not been replaced by other forms of exercise, it is probable that one should check up a loss in public health.

GROWTH OF OUTDOOR MOVEMENT

But the tendency toward outdoor recreation has been very marked. The present extent of golf playing would be impossible without the automobile. It is true that this sport is chiefly available to those in the higher income ranges, but it nevertheless effects a large number of persons.

More democratic is the development of motor camping, which has become a national pastime.

Our National Parks were visited by 29,000 motorists in 1916 and by 271,000 in 1923. In the National Forests during 1923 there were 8,975,000 motor tourists, which was two and one-half times the number in the preceding year.

Virtually every town west of the Alleghenies has its camp site, which is visited by hundreds, sometimes by thousands, of tourists every year.

This new national pastime of camping has given literally millions of families the beneficial experience of sleeping in the open air. The physical effort of pitching a tent, packing the gear, preparing the camp meals and doing the camp laundry is considerable, as anyone who has tried it knows. In these chores also may be found, for

many, a psychological benefit. Modern civilization with its steam heat, steam laundries and other automatic devices has so organized the details of existence that the physical labor of the bulk of mankind has been minimized. The very difficulties of camping may account for some of its popularity.

BENEFITS FROM DRIVING

While a very large percentage of the motorists are modern Daniel Boones, it should likewise be said that the family which uses its car only for neighborhood tours also finds it an instrument for health. The very act of driving is considered by physicians to be beneficial. U. S. Senator Royal S. Copeland, former Health Commissioner of New York City, has this to say on the subject:

Of course motoring bestows its greatest benefits on the person who drives the car. Not only does the driver get the full benefit of open road and fresh air, but he gets actual physical exercise in a form best calculated to repair the damages wrought by our modern existence. The slight physical effort needed in moving the steering wheel reacts on the muscles of the arms and abdomen. Most of us get enough exercise in the walking necessary, even to the most confined life, to keep the leg muscles fairly fit. It is from the waist upward that flabbiness usually sets in. The slight, but purposeful effort demanded in swinging the steering wheel, reacts exactly where we need it most. Frankly I believe that steering a motor car is actually better exercise than walking, because it does react on the parts of the body least used in the ordinary man's routine existence.¹

It is true that one occasionally meets a modern Thoreau who laments the motorization of our highways and the conquest of the wilderness by the populace. For him one must have sympathy and recognize considerable

justice in his plaint, but in terms of mass recreation, bringing the millions into contact with the outdoors, credit must be given largely to the automobile.

BETTER AND PROMPTER MEDICAL TREATMENT

This health-building preventive aspect of the situation is the particularly encouraging side of the picture.

But the automobile is likewise proving an effective aid in the field of medical relief. Pennsylvania, for instance, has an inspector who drives about the state inspecting the water of roadside streams.

North Carolina has ninety public health officials, most of whom cover their territory by means of motor transportation.

The number of physicians in the country has declined in the past ten years despite the growth of population, as noted by the following figures from the U. S. Bureau of the Census:—

1910.... 151,132 physicians

1920.... 150,007² “

Considered in ratio to population the figures are these:

1910..... 1 physician to
608.5 persons

1920..... 1 physician to
704.7 persons

To say that this reduction in the number of doctors may be accounted for by the time-saving factor of the automobile will meet with a challenge; and yet it can be in considerable measure sustained. It is true that more effective sanitation may have reduced the need for the doctor's aid. It is also

² The ownership of automobiles by physicians is virtually universal, though there are a few exceptions among those doing chiefly office practice. Based on questionnaires and checking of registration lists, the National Automobile Chamber of Commerce estimates that 144,000 cars are owned by doctors.

¹ From *Motor*, July, 1922.

possible, as some assert, that the financial rewards of the doctor today, considering the difference in the purchasing power of the dollar, are not as attractive as they used to be. Also, higher educational requirements are sometimes given as a leading reason for the limitation in the number of physicians.

On this last point, the automobile has probably had a noteworthy effect. The individual is not dependent upon the service of his neighborhood physician. If the country doctor does not keep abreast of the times, the farmer clientele can drive into town. The opportunity of the public to choose, made possible by the wider range of transportation, tends to keep the standards high.

But whatever may be the dominant cause in the reduction of the number of physicians, certain it is that the doctor's life has been made more efficient and more agreeable by the introduction of the automobile.

WHAT 2,286 THINK ABOUT IT

The National Automobile Chamber of Commerce some months ago sent a questionnaire to 10,000 doctors, asking them whether they owned automobiles and to what degree motor travel had contributed to their efficiency. There were 2,286 replies. Virtually all of these were possessors of motor cars. A few, less than fifty in all, stated that they used their vehicles for recreation only, as their work was confined to office practice. Some of these noted that their large office practice was possible because of the large radius of motor travel.

More than a fifth stated that their efficiency was doubled, a similar number noted a 50 per cent gain and 5 per cent stated that their effectiveness was trebled through the use of motor transportation.

Nearly all noted that motor travel was a great help to them in their work. The burden of the replies can best be illustrated by four or five quotations:—

Draw your own conclusions as to the increase in efficiency of a country doctor, as to percentage it is as the German mark to the U. S. dollar at present.—Forest Grove, Oregon.

Without car would be confined to a small territory. Now can see patients in any part of the city or in surrounding country.—Portland, Oregon.

Do twice the work in half the time.—Mine La Motte, Missouri.

Affords: (1) Prompter service; (2) Opportunity to get out to attend medical clinics and societies; (3) Get in touch with modern advance in medicine; (4) Enlarges one's ability to help neighboring physician during his absence.—Fernville Michigan.

Spend more time at house and office, volume of practice has not increased.—Troy, Texas.

It would seem impossible to practice medicine in this day without an automobile.—Lincoln, Nebraska.

Questionnaires, to be sure, have their quagmires. One does not know how much care has entered into the replies. A personal instance is often more convincing.

The writer has a friend who is a doctor in a Connecticut farming community. Without preliminary discussion of the subject, he asked the physician to describe the difference between the profession of doctoring by motor travel as compared with the horse and buggy days. Here is the doctor's comment:

There were two doctors when I came here. At times there have been three. But now that I have an automobile I can readily cover the region.

But the strange part of it is that I have fewer calls to make on the same people. The fact is that the automobile and the telephone have *set people's minds at rest*. They don't send for me in the middle of the night the way they used to. If it is

only a slight matter they wait until morning. If a little more serious, they telephone. Only in emergencies do they ask me to come to the house at night. In the past they wanted me to come anyway, in case there might be critical developments; but now they know I can get there in no time if needed, and they do not worry.

As one glances around in this present age, one finds that Ponce de Leon was perhaps not so foolish after all. Grandmothers refuse to sit by the fireside.

Men take pride in being vigorous and active until the final roll call.

This is a subject which deals with habits, customs, family life and the temperament of a people. It cannot be carefully measured with calipers. The automobile, in short, is a participant in, to some degree a creator of, this travel-eager country, this modern spirit desirous of movement and adventure, which is typical of health and youth.

The Automobile and the Pioneer

By WILLIAM JOSEPH SHOWALTER, Sc.D.

Assistant Editor, National Geographic Magazine

THE automobile has extended, to a striking degree, the territories over which civilized man holds dominion.

One needs only recall the work of the French in establishing motor routes over hitherto uncrossed areas of the Sahara Desert, or the success of Dr. Roy Chapman Andrews in using automobiles in exploring the heart of Inner Mongolia, to realize the truth of that statement.

The pictures Dr. Andrews brought back with him afford convincing evidence that the modern American motor car is built with a factor of safety, large enough to make it a dependable vehicle of transportation where even the idea of good roads has never penetrated. I recall seeing his trucks pushing bravely on through mud and mire, over stony stretches of roadless desert, and across gullies and washes, until I had to marvel that any motor vehicle could come through in running order.

I little wondered, as I watched the pictures on the screen, that the insurance companies in Peking had refused to write policies on any car venturing into such hazardous regions and upon

such trying tasks. But no terrain that stretched before them and no obstacle in their pathway was able to turn them aside or keep them from returning safely, and in good running order, to Peking. Indeed, they came through their season's grueling grind in such fine shape that they were sold for 75 per cent of their cost price, as second-hand machines, much to the surprise and somewhat to the discomfiture of those who had refused to write insurance on them.

When we remember that there are probably a dozen makes of automobiles of low- and middle-price range, which would have given the same sort of account of themselves, we begin to appreciate the sturdiness and endurance of American-built cars, and their ability to open up well-nigh inaccessible regions to modern travel.

PLEASURE IN MOTORING?

During the past summer I traveled in the West. My journeyings by rail gave me a somewhat extensive acquaintance with the Apache Trail, the Santa Fe Trail, the Overland Trail and

other highways across the Great Plains, the Great Basin, and our own western deserts.

The car-window panorama at every turn revealed motor tourists, both westbound and eastbound, with their cars converted into veritable carryalls for human beings, baggage and camp equipment.

From the vantage point I occupied, their trip across plains and deserts seemed everything I would want to avoid. Rough, unimproved roads, hot deserts, mud to contend with here, and dust to battle against there, I could not see how a single tourist, packed, as they were, like sardines in a box, amid a jumble of suit-cases, cooking utensils and camp impedimenta, could extract an iota of pleasure from traveling in such style.

Water had to be carried for radiators that seemed to be perennially hot; vast stretches of burning sands had to be crossed where life had been scorched and parched out of everything but the hardest of desert fauna and flora; service stations were as scarce as the proverbial hen's teeth.

No wonder I thanked my stars that I was in a comfortable limited train.

But when I met these same folk in the hotels where they broke their journeys, what a happy, exuberant, brimming-over-with-health lot they were! Not one of them with whom I talked failed to wax enthusiastic over the joys of overland touring. And so many of them had made similar trips before and were planning others for the future that I began to realize that perhaps it was their turn to pity me for my effete love of ease.

At the Grand Canyon, at Los Angeles, at San Francisco, at Salt Lake City—everywhere I went there were veritable hordes of motorists—people from well-nigh every state, and every one of them delighted with his or her ex-

periences. Small children, schoolboys and schoolgirls, families, women without men in their parties; but no, not one among them disheartened with the toils of the road behind them or awed by the miles ahead of them!

Passing down over the El Paso Southwestern from Tucumcari to Vaughn, our road ran parallel to the Apache Trail. The conductor of our train was a typical railroad man of the bounding Southwest. He had rail-roaded extensively in Mexico before the abdication of Porfirio Diaz, and had settled down to railroading in the Panhandle. Sitting in the chair beside me in the club car, he commented on the number of westbound motorists from the East that late in the season.

He, too, had the car-window viewpoint on crossing the deserts in a motor car.

"None of that for me," he remarked with a wry smile, between puffs of his store-bought corn-cob pipe. "I had business in California last spring. Going there by rail, I bought a second-hand Ford for \$100, traveled 5,000 miles in it over the fine roads of the Pacific coast, and then sold it for \$75."

CONQUERING THE DESERTS

Whatever one's attitude toward traveling by railroad or highroad, where they parallel one another across desert and plain, the fact remains that in the hands of the pioneer, the automobile is remaking the geography and remodeling the life of many areas either very remote or practically inaccessible.

The expedition of Dr. Andrews into Inner Mongolia has brought Urga within four days' travel by motor car from Kalgan, where formerly it was twenty-odd days by camel or thirty-odd by bullock cart. Cars are now being dispatched each way between the two cities on the 5th, 15th, 19th, 20th, 25th and 30th of each month, reaching

their destinations in four days. Passengers are allowed thirty pounds of baggage, and a fare of \$120 is charged. Intermediate stations where food and lodging are obtainable have been provided. In this way the Gobi Desert is beginning to see a motorized version of the old stagecoach days of our own pre-railroad and Wild West days.

Motor trucks are also being considered for the Kalgan-Urga route and it is expected that before many months freight will be moved by fleets of them, and the old-time bullock carts and camel trains will pass into the discard.

The distance between Kalgan and Urga is 550 miles. Except for about fifteen miles in the Kalgan Pass, where the road climbs to the table-land at Hanaba, and another stretch of gravely waste land across a spur of the Gobi Desert, which may be passed in about five hours, the going is over grazing lands not greatly different from the plains of western Kansas. Altogether the country is adapted to automobiles in dry weather, which prevails most of the year, the only rain coming in thunderstorms and showers in the summer. For four months during the winter the temperature is around zero or below, and for two months more, seldom rises above freezing.

In the Sahara the caterpillar tractor has met the camel in his own private preserves and defeated him, bringing Timbuktu within twenty days of Tuggurt, instead of the ninety days of the camel train.

FROM TUGGURT TO TIMBUKTU

The railhead in southern Algeria is at Tuggurt, a sand-locked terminus on the northern edge of the great sea of sand. About a year ago the French decided to send an expedition from that point to Timbuktu with tractors substituting for camels. Preliminary parties were sent a distance of some 625 miles into

the desert, from the two termini of the route, to establish supply depots. Once these depots were laid down, a stretch of 750 miles lay between them.

Starting from Tuggurt, the expedition headed for Wargla, in the heart of a famous, date-growing district. This 125-mile stretch was covered without difficulty. Thence the expedition moved on, following the dried-up course of the Wadi Mia to Fort Hassi Inifel, some 250 miles southward. Here the route came to the chain of sand hills known as the Great Eastern Erg, which stretches from Morocco to Tripoli, almost without interruption.

Beyond Inifel the sandy plain, strewn with bluish and gilded dunes, gives way to a desolate, gloomy country, full of sharp rocks and cut by deep crevasses, and known as the Tademait. Still further on came the Ain El Gettara Pass and the Tidikelt Plain, covered with boulders, and menaced by marauding fanatics. Thence the expedition moved on to In-Salah, a great oasis and caravan center, and later reached the Hoggar country, the real center of the Sahara. Reaching the Hoggar country through a pass in the blue mountains of Muydir, the expedition moved on and came to the Tanesruft, an almost waterless region of sandstorms, boulders, and rocky, dry valleys. Thence pushing forward to Kidal and on to Burem and the Niger, Timbuktu was reached, only twenty days out from the Mediterranean railhead.

For nearly a hundred years France has been striving to effect a commercial and political liaison between her colonies on the Mediterranean Sea and those along the Niger River. At last motor transportation has broken down the desert barrier and pointed the way to the realization of a century-long ambition.

At many places en route, bleaching bones and hyena-torn bodies of dead

camels were silent witnesses to the fact that the caterpillar tractor could brave climatic conditions before which even the sturdy "ships of the desert" had gone down.

A ROUND-THE-WORLD MOTOR CARAVAN

One may gather an idea of how far the motor car has gone toward bringing all lands under its dominion by studying the plans of Robert R. Reynolds for a round-the-world motor caravan. He proposes to organize a world sight-seeing tour with a thousand people.

Embarking in a specially chartered freighter at New York, the caravan would land at Casablanca, Africa. Thence it would make its way through Morocco, Tunis, Tripoli, Algeria and Egypt, crossing to Asia over the Isthmus of Suez, and going through Palestine, Persia and Arabia to Bagdad and Basra. There the ship would take the caravan aboard for India, which would be crossed by motor. Embarking again, the caravan would be landed in Java, which would be toured from end to end, after which Siam and Indo-China would be traversed, with a tiger hunt and an elephant hunt as a part of the program.

Embarking at Saigon, Indo-China, the expedition would call at various Chinese and Japanese ports, touring inland from them, and then turning the freighter's prow toward Vancouver. Landing there, a transcontinental tour through parts of Canada and the United States would constitute the concluding leg of the vast swing around the circle of the earth's surface. It is estimated that for every 100 tourists twenty trucks would be required, and that about eight months would be necessary to make the trip.

HUMANIZING THE LONELY PLACES

In our own country the automobile means perhaps more to the pioneer who

pushes on beyond the horizon of occupied territory than to any other individual. Go with me out over the plains of the region west of Bismarck, North Dakota and Dodge City, Kansas and east of the Sierras and the Cascade Range, and you will see tens of thousands of families living in an isolation so remote that the horse and the burro cannot conquer it. But the automobile makes a horsedrawn journey of a week a matter of going one day and coming back the next.

As I have ridden through great stretches of desert and plain, with the houses so far apart that there was seldom more than one in any circuit of the horizon, and with the tiny villages so remote from one another that one grew lonesome between them, I have had brought home to me the vastness of the service the automobile renders such districts, by shortening up the open spaces and bringing families and communities within social and commercial range of one another.

IMPLEMENTS IN THE EMPIRE BUILDER'S HANDS

One afternoon I strolled down from the El Tovar, at the Grand Canyon, to the forest ranger station.

A fine, husky family, in a sturdy, middle-priced car, pulled up. The father alighted, went in, and began comparing the available maps of south-western Utah with his field-made ones. It developed that he was a professor of engineering in a mid-western university.

"There isn't a map of the section through which I came that correctly represents most of it," he remarked. "We wandered here and there and often were able to make no more than fifteen miles a day, but we have plotted the route over which we came, and every one of us is in finer physical condition because we really got back to

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Nature. Furthermore, we will give the world a better picture of motoring facilities in the region through which we came."

A great many remote regions are thus being mapped in the Rockies and westward to California. Scores of places filled with natural wonders and splendid scenery, such as the great natural bridges, splendid petrified forests and fine caverns, are being brought within the range of the vacationist through the Twentieth Century pioneer and his automobile. Places that within the memory of men, who have not yet passed over the hilltop of life, have been transformed from deserts into lands flowing with milk and honey.

Today there are thousands of square miles of territory that await a similar transformation, and, as America grows in population, the automobile and the motor truck will be the prime implements in the empire builder's hands.

Grand Junction, Colorado, is one of the most magnificent oases in the world, entirely man-made. Hundreds of sites of future Grand Junctions are lying around the West, awaiting only the time when the press of population will make their development necessary.

Irrigation will be imperative, but when we become land-hungry enough the lands will receive the water they need, and we will pay the price that demands.

But always and everywhere that man lives remote from his fellow man, and communities are remote from their nearest neighboring communities, the automobile and the motor truck will be the foremost agency, first in the pioneering, and then in the filling up of the interstices that shall knit communities together and bring new areas into production to meet the needs of an ever-expanding race.

Linking Up Railroad and Water Transportation

By DORSEY W. HYDE, JR.

Formerly with Packard Motor Car Company

THE object of this paper is to discuss the motor vehicle as a unit in the transportation system as distinct in character as the steamboat or the locomotive, and to emphasize its growing importance as a public utility or common carrier and the need of understanding it and providing for it as such. Automobiles for personal use, or used in connection with a private business not affecting the public at large, do not fall within the scope of this discussion.

That "there has been too little recognition of the fact that in reality motor truck transportation is, or should be, a great public service, and that it is a common carrier as much as a rail-

road or steamship line,"¹ is sufficiently demonstrated by some ill-considered public regulation on the one hand and by some overenthusiastic commercial exploitation on the other. The state legislature which slows up industrial development by unduly restricting the motor vehicle is as derelict to public interest as the motor bus promoter whose aim is "to run the street railway company out of business."

THE FUNCTION OF TRANSPORTATION

It is perhaps unnecessary to stress the fact that business activity, as ex-

¹ "Motor Transportation of Merchandise and Passengers." Percival White, New York, 1923, page 2.

pressed by such words as commerce, trade, traffic, barter and exchange, implies the movement of articles from one place to another. In strict logic no business transaction is complete until the buyer has deposited with the seller the agreed-upon value equivalents and the seller has deposited the article sold in a place designated by the buyer.

The practice of shipping goods F. O. B. conflicts with our definition of the requirements of a business transaction. The adoption of this practice is significant: it illustrates the seller's desire to free himself from a part of his responsibility in the sales transaction. Why did he want to evade this responsibility? The answer to this question may throw some light upon recent shortcomings in our national system of transportation.

SOME ASPECTS OF TRANSPORTATION HISTORY

Preoccupation with major transportation problems is characteristic of modern transportation development. The needs of producing, manufacturing and distributing centers must first be met. It is natural, also, to become preoccupied with the one transportation unit best fitted to supply the principal need. During the canal-building era in Great Britain no one knew when to stop and if funds had held out England might have become a close second to Mars. Likewise with the locomotive; ill-considered line extensions came to be a matter for parliamentary consideration and after many years of co-operative effort, through a short lines railway association, the financial condition of these railways was still unsatisfactory.

The great task of financing and constructing the American railroad system dimmed our remembrance of the fading glories of the clipper ship era.

The result was the development of a railroad system of unprecedented size and efficiency, and the Baldwin Triplex locomotive took its stand beside Donald McKay's *Flying Cloud* or that proud clipper *The Sovereign of the Seas*.

In the pride of this achievement we should not forget that America also developed a short line or spur line railway problem and that manufacturers cut the Gordian knot of their transportation difficulties by adopting the practice of shipping goods F. O. B.

RESULTS OF PAST TRANSPORTATION DEVELOPMENT

All things considered the American achievement in transportation organization is unique. In a miraculously short space of time a great major transportation system was created to serve widely-scattered producing and distributing communities. This system was articulated to a considerable degree with existing ocean and inland water transportation facilities. The effect upon the agricultural and industrial development of the country was immediate. Rocky Mountain metals were made valuable through accessibility. Texas farm lands increased to 6 per cent of the total value of such land in the United States and Dr. Friday states: "It is obvious that no such values for this land could exist at points so far distant from the consuming center of the country without our present-day system of transportation."²

The advantages of this major transportation system to the larger business centers are well known. Converging networks of railroads pour their burdens of riches into the terminals of New York, Boston, Philadelphia, Balti-

² "The Place of Railway Transportation in Our Industrial Structure." Compiled by the National Transportation Institute's Research Council, David Friday, Director, February, 1924, page 7.

more, Chicago, San Francisco and other cities. Increases in property values and stimulated business activity followed in the wake of right-of-way construction and communities vied with each other to induce route modifications which would bring the railways to their doors.

The spread of commercial prosperity was not confined to the territories immediately served. As already pointed out, the increase in prosperity was general. No community, perhaps, could legitimately claim anything but advantage from the coming of the railroads. There were some, however, who claimed that advantages were disproportionate, thus working comparative injustice upon those regions less effectively supplied with railway service.

THE LOCAL TRANSPORTATION SITUATION TODAY

The war-time breakdown in short haul and L. C. L. railway shipping service, gave advance notice of the defects in our system of domestic distribution. Today, with the aid of congressional and other investigations, we are discovering that the cost of distributing commodities is out of all proportion to the costs of raw materials and fabrication. We have here, perhaps, one reason for the growth of the F. O. B. practice; certain it is, in any case, that weak spots in the transportation system are reflected in the index of the cost of living.

Business prosperity traceable to our efficient major transportation system is not without its defects, if there is failure to make provision for adequate minor or ultimate transportation from distributing centers to the point of final consumption. As pointed out at the commencement of this paper, a business transaction involves complete, not part way, transfer from seller to

buyer. Increased business prosperity brings an increase in manufactured products and these products must be effectively distributed. As the volume of freight and passenger traffic increases, the use of the transportation systems is intensified to a point where all defects become increasingly apparent.

The volume of trunk line freight and passenger movement today is such that our terminal facilities in major distributing centers are becoming hopelessly choked. Sluggishness in the last stages of distribution means harder living and less comfort in remote sections of the distribution area. Such sections become less desirable for business and residence purposes and the exodus to the city commences. The city, already overcrowded, grows to disproportionate size and starts upon the road to traffic congestion, fluctuating costs, bad housing and civic stagnation. It is evident, therefore, that our problem is to link up local transportation agencies to facilitate freight and passenger movement at terminals; to insure more prompt and economical distribution of persons and commodities throughout natural distributing areas; and finally, to make possible the progressive decentralization of urban population by bringing to remote sections the comforts and conveniences which heretofore have been the prerogatives of the city.

SOLUTION OF LOCAL TRANSPORTATION PROBLEM

It is evident that proper recognition has not been given to the dual nature of the national transportation problem—its major, or trunk line, functions, and its minor, or local distribution, functions. If major transportation is to be allocated to ocean and river boats and locomotive trains, it is equally essential that we divide up minor or local

transportation among short line railways, electric traction lines, and the motor and other trackless vehicles.

If we visualize this problem of localized distribution, we will find that the country may be divided into natural areas or regions for distribution purposes. Such regions are determined in part by the major transportation system, in part by topographical conditions, and in part by the facilities afforded by the present local transportation agencies. These natural regional areas for distribution, it should be pointed out, are already recognized in the structure of the sales organizations which have been developed by large manufacturing concerns. Our problem, then, is to determine how available transportation mediums may be best organized in such regional distribution areas so that the final step may be taken in perfecting a national distributing system of maximum efficiency.

The first step, obviously, is to select appropriate transportation mediums and to determine what part of the task each should perform. Unfortunately our knowledge of the relative spheres of such local transportation units as the trolley, the bus, the motor truck and the horse-drawn vehicle, is incomplete. As the result of a recent study of this problem, a special committee representing the various transportation interests involved, concluded that

there is . . . a zone, flanked on one side by an area of long haul which should belong primarily to the steam and electric railroads and waterways, and on the other by the short-haul zone in which. . . motor transport should play a larger part. The economic limits of the zones vary greatly according to the commodities and the local conditions. Where good highways exist it appears that for distances up to 10 miles in some instances and to 25 miles in others the motor truck has the advantage over the steam or electric rail-

road, and that beyond 50 miles under certain conditions and 150 miles in others the railroad should generally have the field. This leaves a competitive zone with a lower limit of 10 to 25 miles and an upper limit ranging from 50 to 150 miles and more in special cases. Within this zone each form of transportation has its advantages to the shipper who should be free to make his choice with due regard to cost, time of transit, reliability of service and other considerations.³

At the National Transportation Conference held in Washington last January, representatives of commerce, industry, mining, agriculture, labor, insurance, finance and transportation considered the report of the above-mentioned committee. After full discussion the conference expressed its opinion that:

The motor vehicle has proved its unquestionable value in our economic system, having greatly extended the farmer's field of operation, brought much additional land under cultivation and new sources of raw materials within economic reach of markets, quickened the industrial life and facilitated the processes of distribution.⁴

The important part which the motor vehicle plays in local distribution areas becomes more evident every day. In the field of urban transportation we are coming to realize that it is useless to multiply the size and number of railway freight and passenger terminals if the carrying surface of city streets is taxed to capacity. Mr. Hoover has pointed out that

the expansion of terminal facilities at our larger centers in the next twenty years will

³ Report of Special Committee IV, appointed by the President of the Chamber of Commerce of the United States, on "Relation of Highways and Motor Transport to Other Transportation Agencies," page 21. Washington, D. C., November 2, 1923.

⁴ Report of the Transportation Conference called by the Chamber of Commerce of the United States, January, 1924, Washington, D. C. page 10.

be required to a degree that seems almost hopeless with the present methods of terminal distribution and collection. Nor is the problem one solely of increased trackage and shed facilities. It is a problem that affects congestion in the streets and ramifies in a hundred directions in our municipal life.⁵

In Mr. Hoover's opinion real improvement may result from the application of motor truck service to facilitate terminal traffic movement in large urban communities, and indication has already been given of the extensive field for motor transportation in suburban or regional distribution areas.

In the light of developments such as the above is it too much to claim that the time has come to place the motor vehicle in its rightful position along with the electric trolley, the Baldwin locomotive, and Donald McKay's beautiful clippers, as the fourth great American achievement in the perfecting of modern transportation mediums?

THE SCIENCE OF AUTOMOTIVE TRANSPORTATION ENGINEERING

The rapid growth of automotive transportation has resulted in the creation of a new branch of engineering science frequently referred to as automotive transportation engineering. The principles of this new profession have already been formulated by S. V. Norton, F. Van Z. Lane, Percival White and others in this country and by J. Phillimore in England.⁶ Credit

⁵Address of Hon. Herbert Hoover . . . at the Transportation Conference called by the Chamber of Commerce of the United States, Washington, D. C., January 9, 1924, page 6. Compare L. F. Loree's figures as to time freight cars remain in terminals as given in his recent book on "Railroad Freight Transportation," page 264.

⁶See "The Motor Truck as an aid to Business Profits," S. V. Norton, Chicago, 1918; "Motor Truck Transportation, the Principles Governing its Success," F. Van Z. Lane, New York, 1921; "Motor Transportation of Merchandise and

for the accumulation of valuable cost and engineering data is due to several of the leading American motor vehicle manufacturers, among which may be mentioned the Packard, Pierce-Arrow, White, Mack and Autocar companies. Automotive transportation engineering has been defined as the science of moving persons and things from place to place over public highways in such fashion as to entail a minimum of expense and a maximum of dispatch, safety and comfort.

The task of the automotive transportation engineer is to apply his special knowledge in solving particular haulage problems. Faced with a given task of transporting certain units of bulk and weight, he must study the motor units at his command and select those best qualified for the task. His final choice will be influenced by such factors as the nature and amount of goods to be hauled, length of haul, number of stops, loading and unloading conditions, road surfaces and grades, etc. These facts are then considered in relation to four transportation principles, enumerated by the late S. S. Merithew as follows:

(1) Other things being equal *the cost per day* varies as the daily mileage the truck is operated. The cost per day should increase as the daily mileage increases.

(2) Other things being equal *the cost per mile* varies as the daily mileage the truck is operated. The mileage cost should decrease as the daily mileage increases.

(3) Other things being equal, *the cost per unit* (for example, ton) will depend on the truck capacity and the distance hauled.

(4) Other things being equal *the cost per unit-mile* (for example, ton-mile) will depend on the truck capacity and the daily mileage traveled.

The transportation engineer applies these principles to the facts of a par-

Passengers," Percival White, New York, 1923; "Motor Transport for Commercial Purposes," J. Phillimore, London, 1920.

ticular case to determine the truck capacity best suited to the job. When this is known he proceeds to equip the units chosen to meet operating conditions, and these latter may also be modified by the construction of loading platforms, carrier devices, and the like.

An example typical of this procedure is given in the account by an automotive transportation engineer of how he solved the haulage problem of a certain mining company:

After analyzing the situation, I found that they were paying 80 cents per ton for the leased motor truck, and about 65 cents per ton for their own teams. I informed Mr. ——— that they could haul the ore for less money with ——— trucks, but they would have to make the following changes. First, they would have to arrange for dumping or loading the ore from hoppers into the truck; also they would have to have special bodies built for the truck . . . (and) make arrangements at their plant for unloading trucks in less time. This, I showed them, could be done by specially constructed bodies. I also demonstrated to them that the trucks could be operated with two trailers to each truck, the haul being down a $2\frac{1}{2}$ per cent grade from the mine to the plant, (and) the truck having no work to do practically, except to act as guide or pilot for the trailers. The truck, of course, having plenty of power to pull the trailers back from the plant to the mine . . . We finally got the ——— company to order one six-ton truck . . . We built a special body that would carry a little over seven tons. We also got them to buy a six-ton trailer to operate with the truck. *With this outfit, they were able to cut their hauling costs down to about 35 cents per ton.* I later got them to place a second order for another six-ton truck and trailer on the strength of the performance of the first six-ton truck and trailer. We are at this time figuring with them on their third outfit.

THE PUBLIC ANGLE IN AUTOMOTIVE TRANSPORTATION ENGINEERING

Although there is increasing use of motor vehicles in public or semipublic

service, such as municipal and school bus lines and interurban express service, thus far the applications of automotive transportation engineering have been largely confined to the solution of commercial and industrial haulage problems. More recently one of the largest American cities has retained a prominent automotive transportation engineer so that the benefits of the new science may accrue to the public interest. In general, however, scientific planning is noticeably absent in the efforts which have been made to organize and co-ordinate urban and suburban systems of transportation.

Because of this lack of intelligent planning, the forces which have made for urban centralization have reached the peak of possible congestion. Referring to "industry's escape from congestion," Graham Romeyn Taylor pointed out that "when industry moves out from the city it is seeking economic advantage,"⁷ and John Ihlder has emphasized the point that "industrial decentralization also means lessened waste in transportation" because of benefits to be derived from increasingly effective automotive transportation service.⁸

The need for the large-scale application of automotive transportation engineering in regional distributing areas daily becomes more imperative. However, the way in which this may be effected is not clear. Under our present governmental organization we have local authorities concerned with street construction and street planning and lay-out, but attention to the regulation of street use until recently has been largely restricted to the one controlling

⁷ "Satellite Cities," Graham R. Taylor, New York, 1915.

⁸ "A Standard of Community Excellence," John Ihlder, 1924. See also his paper "Regulating the Automobile When Standing," 1923. Both issued by the Chamber of Commerce of the United States, Washington, D. C.

aspect, the prevention of accidents. Even if our local efforts at traffic regulation were extended to include greater attention to the organization and regulation of automotive transportation, the value of such effort would be questionable unless some way were found to include suburban districts within the planning area. There is a decided movement for the creation of metropolitan planning areas with centralized jurisdiction along the lines of the Boston metropolitan utility organizations, but this movement thus far has been without result.

In addition to the planning and organization of certain public aspects of transportation service, provision must be made for the enforcement of legal regulations. It has been urged that local motor transportation systems be made subject to regulation by state public service commissions. In distributing areas of major population size it is possible that this function will be delegated to some special branch such as the former Public Service Commission of the First District in New York City.

In accordance with American doctrine, the task of developing regional motor transportation systems is being left to private initiative. Efforts thus far have been complicated by the need for co-ordinating the new form of transportation with existing forms and we have witnessed some unfortunate clashes between the trolley and the passenger bus and the short-haul locomotive and the motor truck. Recent developments, however, indicate a growing recognition of the importance of viewing the problem as a whole and of co-operative effort by all transportation agencies in the development of a co-ordinated system in which each will play its proper part. Without doubt much may be accomplished by

far-sighted efforts of this kind, but it is necessary to remember that the experimental period is the period of greatest cost in invested capital and this burden necessarily tends to emphasize the need for profits rather than effective service.

It is generally agreed that public regulation of motor vehicle common carriers is in the interest of both parties concerned, provided that such regulation is based upon the principle of a fair return on capital investment. Such regulative measures as have been enacted in the past aim principally at the prevention of accidents or the securing of a tax or license income to defray the costs of road construction and maintenance. These measures, on the whole, have failed to meet requirements. The time has come for state and local legislative bodies to view the regulative problem as a whole. They must give more serious consideration in granting franchise concessions to motor transportation agencies and begin to think about the need for the development of standard freight tariffs and passenger transportation rates, of continuous and regular operating schedules, and of service extensions necessary to meet the requirements of the entire regional transportation area.

Automotive transportation has yet to reach its first quarter century of development and in its freight transportation aspect it is barely ten years of age. If its progress thus far is any indication, a serious effort to apply its facilities in accordance with modern engineering principles and public service requirements should result in a revolution in our methods of local and regional transportation. When this step is effected we may safely claim to have succeeded in the linking up of existing elements in our national transportation system.

The Automobile and Recreation

By M. H. JAMES

Publicity Director, Department of Highways, Commonwealth of Pennsylvania

THE writer of a popular song mourns in his chorus the departure of the covered wagon days, and for months singers and jazz orchestras bemoaned the passing of that period in American history. But there is infinitely more melody in the popular song than there was in the lives of those persons whose acquaintance with nature began in a covered wagon.

Other than food, clothing and the daily wage, no subject interests so many people as the automobile and the possibilities of its use. In Pennsylvania, for example, a million, one hundred thousand passenger vehicles were licensed in 1924. Roughly speaking, one person in every nine Pennsylvanians owns an automobile. The million, one hundred thousand car owners carry with them approximately half the population of Pennsylvania. That is the reason the State Highway Department has had to develop a touring information bureau, the radio broadcasting stations each week give information concerning road conditions, and the daily and weekly newspapers use prominently all material available as to the travelability of thoroughfares not only in Pennsylvania, but in the entire eastern section of the United States.

HOW AND WHERE AMERICANS PLAY

The American people have revamped their ideas on recreation since the automobile became popular. The average summer vacationist, for example, no longer reserves a hotel room in the mountains or on the coast for two weeks. The so-called "summer hotels" have had to change their methods.

The automobile tourist does not linger indefinitely in one place. He knows there are miles of good roads ahead of him and scores of places where enjoyment may be found. So the hotels which cater to recreationists are filled with one-nighters; and each morning finds the highways filled with travelers bound for new fields. The armchairs on the verandas are empty. The night clerk, who formerly found it possible to doze in his chair until six in the morning, must now be alert two hours previously, arousing that indefatigable portion of the motoring public which begins its journey at daybreak. And there are countless thousands of these 18-hour travelers—drivers who are in Philadelphia at dawn and in Boston soon after nightfall. On all main thoroughfares there are endless processions of cars bearing pleasure seekers; and the proprietors of inns and taverns, or hotels of high and low degree, are burning grey matter in the effort to stop these tourists and turn them into money.

The manufacturers, who at one time produced bronze letter openers, mustache cups and ornamental shoe buttons for Christmas gifts, have changed their equipment so that now they produce in huge quantities the curios with which the vacationist's car is filled upon his return home. Quite as odd as the Indian novelties picked up where Indians never trod are the "shore dinners" served two hundred miles from the ocean.

Complaint is made by grave economists that the American public has gone mad in its desire to purchase rolling stock, rather than to own its home.

Those persons who naturally and consistently "view with alarm" see in this inclination of Americans nothing less than the fall of the Republic; and they say it is an indication that thrift has gone overboard. But if not so many persons are listening to the siren call of real estate dealers, or of the bankers who desire more deposit money to loan out at six per cent, the red corpuscles are more numerous in American blood and there are roses blooming in cheeks once palely gaunt. The family of Mr. E. P. Unum, camping over night in a fence corner, is horrified when it sees a baleful gleam from two saucerlike eyes across its roaring camp fire; and the house cat of Farmer Brown is chagrined that its friendly advances were so speedily repulsed. The automobilist is getting his daily dozen touches of nature that make the whole world kin.

The Witch House, or the House of the Seven Gables in Salem, Washington's headquarters at Valley Forge, the stone marking the "high water mark of the Rebellion" at Gettysburg, the grave of General Braddock on the Old National Pike, the "painted post" not far from Corning, N. Y., the underground caverns of Luray, the clam-filled mud of the eastern shore of Maryland, the playground of the Poconos in Pennsylvania, the shrine of St. Anne, north of Quebec, the sites of the first settlements in Virginia—all are old familiar places to the recreationists who roll tirelessly through many marvelous miles of scenic splendors. Folks who ten years ago were unfamiliar with grass except as it grew in parks can now distinguish instantly the difference between poison ivy and the trumpet vine. Twenty years ago it is true the foundry worker who received \$2.40 a day owned a house and lot, but his acquaintance with the open country was confined to the stretch along the dusty road on which he took his Sunday afternoon

walk, or to the section through which he passed when on rare occasions he voyaged in the "steam cars." As he sat on his front porch in the early evening he saw the banker hurtling by behind a pair of sparking cobs. But there was little or no envy in him—he considered it part of the general scheme of things. Perhaps he dreamed that some day he might strike oil.

But it is not necessary to be Coal-oil Johnny Steele in order to enjoy the pleasures made possible by the automobile. The famous Steele, a country lad into whose lap poured untold wealth from the oil wells of Pithole City, with all his gold could not have purchased a summer afternoon in even a "flivver." Nor could Jay Gould, at whose touch the frontiers of financial kingdoms oscillated upon the map. But the world is indeed the oyster of Mr. E. P. Unum, whose week-end journeys begin at noon on Saturday and end in the twilight on Sunday. More powerful cars than his may pass him upon the highways, but they cannot surpass the enjoyment of him and his family. There may be more luxurious equipages along the road, but the scenic splendors are common property. There is always "a picture ahead" and they "kodak as they go."

Undoubtedly the automobile is responsible for the perfect highways now to be found in almost every section of the United States. But the perfect highways are responsible for the tremendous increase in the number of automobiles. This succession of events will continue indefinitely—more roads, more automobiles; more automobiles, more roads. Whether the states of the union are spending as much money for roads as they are for motor vehicles is a question for the highway economist. Growth of automobile ownership has widened municipal boundaries. The actual limits of a city are far beyond

the political city line. Over night the pasture land or the potato field is becoming suburban residence property. Those apostles of gloom who see the downfall of the Republic in the acquirement of motor vehicles by the populace overlook the steady expansion of municipalities. The automobile has made possible residence in what once were isolated sections. Cause and effect are again at work. The automobile enables city workers to live in the country. There is an incentive, therefore, for home ownership. There is a community interest, and a spirit of camaraderie, which did not exist ten or fifteen years ago. Demagogues may rant of classes and masses, but these once separated entities, so far as the automobile is concerned—and the pleasures and benefits derived from its use—vibrate upon the same plane. It is hard to convince Steve Popovich, or Antonio Branca, or plain John Smith that he is being ground into the dust by Capital when at will he may drive the same highways, view the same scenery and get quite as much enjoyment from his trip as the modern Midas.

Those who say the desire to own an automobile has discouraged or reduced thrift overlook the fact that this desire encourages industry. There is at least

the desire to save sufficient money with which to make car ownership possible. And the Old Doctors of Pessimism lose sight of the fact that ownership of a motor vehicle enables one to see what his fellowmen are doing; and there is incentive for better effort on his own part.

The greatness of the United States was simply taken for granted before the automobile enabled citizens to see for themselves the extent of this country. But now unhampered the average citizen drives from coast to coast, from Canadian to Mexican border. He sets up his camp trailer, or his puppet, or he parks his car in the Adirondacks or the Alleghenies; or he finds him a sandy beach along the ocean in New Jersey; or he avails himself of a municipal camping site. He has had a full and enjoyable day. He has climbed mountains and floated down hill. He has passed through timberlands or across farming country or the wastelands left by careless toilers who took toll of nature. He has cooked his own meals beneath the sky, or he has found moderately priced subsistence at lunch stands along the way. And so at close of day, with an enjoyable tomorrow just ahead, he sinks into slumber with a satisfaction never equalled in the covered wagon days.

The Economic Future of the Automobile Industry

By CHARLES CLIFTON

President, National Automobile Chamber of Commerce

SOMEONE has wisely said that the most exceptional person imaginable would be the normal man. Each one of us is sufficiently human to vary at one point or another from the theoretically standardized pattern.

Business, dependent upon the human factor, is subject to similar variations. Accordingly, one cannot usually pre-

dict very closely what the buying habits of the public will be in any given year, or even what represents a normal volume of trade for any given industry.

It is possible, however, to outline certain basic conditions which underwrite the prosperity of a business. In the automobile industry one need but point to three or four factors.

PROSPERITY ASSURED AND WHY

The future market for automobiles in the United States is primarily assured by the fact that there are so many of them.

Occasionally one finds a writer who views with alarm the size of the registration figures, totalling 15,000,000 cars and trucks. But to those in the industry this enrollment is a guarantee of stability.

Not only will the fifteen million need to be replaced some day—a certain proportion every year—but it is also a sign that motor transportation is an integral part of our current civilization. A car to virtually every other family—this means distribution so intensive as to be practically indispensable. Rolling stock will be constantly renewed, as transportation demands require it.

This country, however, has not reached its maximum use of motor transportation, even in the sense of being dependant upon the gains in population and wealth. Progress in the improvement of our highways is being made at the rate of 35,000 to 40,000 miles per year. The Federal Aid Road System will comprise about 180,000 miles when completed, and the mileage of highways for general motor use will total about 800,000. The development of motor travel, as the highways become increasingly improved, will create added markets for cars and trucks.

Motor trucks, buses and taxicabs have registered a marked growth in the past few years. One hundred and thirty-four electric railways are operating bus lines, and 157 steam railroads are using motor vehicles for passenger and freight. This public service offers additional promise of demand for automotive products.

WORLD MARKETS

Abroad, the use of motor vehicles is just beginning. There are obstacles, to be sure. Poor roads, high taxes, tariff walls, and small per capita wealth are conditions which retard motor travel in many countries.

But conditions are changing. The Pan-American nations are holding a congress next year to map out a series of highway programs. In Europe there is a growing tendency to regard motor transportation as an essential feature in the development of the country, which should be encouraged rather than weighted down by many taxes.

In Mexico, the Far East, and the Antipodes motor cars and motor trucks are in active demand.

As only 17 per cent of the world's registration of motor vehicles is outside of the United States, it seems clear that the opportunities have hardly been touched upon.

The American makers do not, of course, expect to get all this foreign business. They recognize that there is future enough for all. But the United States products will have favorable reception everywhere, as they have today. Their powerful construction, and the low prices, due to the advantages of large scale production, place them in the forefront of world competition.

MOTOR PROBLEMS AND EFFORTS TO SOLVE

We recognize that motor transportation brings its problems. Traffic regulation, improved servicing of cars, financing—these are some of the matters to which the industry is devoting efforts toward improvement.

Fundamentally, conditions are sound. The public insists on eating,

on being housed, on being clothed, on moving from place to place. These are determined instincts which will be satisfied, and as long as the desire for personal rapid transportation persists, the automobile industry will have a sound and secure future.

Many merchants, who formerly opposed any parking restrictions, are now coming to a changed viewpoint. That there will be a constant tendency either to limit or to eliminate parking in all the great cities is practically a certainty.

The American Association of State Highway Officials is taking a far-seeing view of this phase of the work.

Its steady aim is the betterment and replacement of present highways where necessary, the banking and widening of curves, the reconstruction of low capacity narrow bridges, the flattening of boulders and widening of fills, and the extension of the line of sight at dangerous curves.

When we leave the strictly official regulation of traffic and enter into the subject of co-operation on part of independent agencies, new possibilities are developed.

Every community should have either

an individual or a commission responsible for its traffic, making studies of the volume and recommending methods for handling.

Many such agencies exist at this time. Some of those that are particularly important naturally include the following:

Existing organized motor clubs offer an admirable nucleus for the furtherance of street and highway safety programs, because of their widespread interest in the cause of highway safety, their means and opportunity for obtaining publicity and their community, state and national influence.

The Safe Drivers' Club is chiefly a medium for getting as many individual motorists as possible to take an active personal interest in public safety.

The act of joining the Safe Drivers' Club usually consists of signing a pledge card, receiving a windshield or other emblem and, generally, paying one dollar or other small sum as membership dues. Such dues, where paid, go to the community safety organization and just about pay the expenses of conducting the educational campaign for membership in the club.

Machinery and Its Effect upon the Workers in the Automotive Industry

By CHARLES REITELL

School of Business Administration, University of Pittsburgh

THE recent development of machinery in American industry has wrought definite changes in the nature of productive effort required of the workers. So pronounced have been the changes that they record definite influences upon the worker's wages, upon his mental actions and reactions, upon his physical being, and upon the whole social and industrial fabric of which he is a part.

Civilization stands before us proud of its achievements in the field of invention. Within a century the steam engine, the cotton gin, the typewriter, the rapid-fire gun, the telephone, the automobile, the turret lathe, the radio—all bear witness to a conquering of mankind of a blind nature.

But there is a backfire to all of this mechanical achievement. The workers by the millions in mills and factories are being shaped to meet the demands of these rigid machines. The requirements of dexterity, alertness, watchfulness, rhythmic and monotonous activities, coupled with a lessening of much of the older physical requirements, are registering results that portray a new type of worker in industry. Mankind has built this steel giant—the machine. He is finding the giant more powerful than its maker.

Literature contains much both in the way of appreciation and depreciation of our mechanical inheritance. Probably there is no bolder contrast in points of view than that shown in the following brief quotations: A most striking depreciation of machinery is expressed in George Moore's *The Confessions of a Young Man*.

The world is dying of machinery; that is the great disease; that is the plague that will sweep away and destroy civilization! Man will have to rise against it sooner or later . . . capital, unpaid labor, wage slavery and all the rest . . . stuff . . . Look at these plates; they were painted by machinery; they are abominable. Look at them! In old times plates were printed by the hand, and the supply was necessarily limited to the demand, and a china plate in which there was always something more or less pretty was turned out; but now thousands—millions of plates are made—more than we want, and there is a commercial crisis; the thing is inevitable. I say the great and reasonable revolution will be when mankind rises in revolt, and smashes the machinery and restores the handicrafts.

In contrast to this denouncement Oscar Wilde pictures the benefits of machinery in *The Soul of Man under Socialism*.

Under proper conditions machinery will serve men. There is no doubt at all that this is the future of machinery; and just as trees grow for the country gentleman while he is asleep, so, while Humanity will be amusing itself, or enjoying cultivated leisure—which, and not labor, is the aim of man—or making beautiful things or simply contemplating the world with admiration and delight, machinery will be doing all the unnecessary and unpleasant work. The fact is that civilization requires slaves. The Greeks were quite right there. Unless there are slaves to do the ugly, horrible, uninteresting work, culture and contemplation become almost impossible. Human slavery is wrong, insecure and demoralizing. On mechanical slavery, on the slavery of the machine, the future of the world depends.

In no industry has mechanical development been so rapid or so far reaching in its effects upon workers as in the automobile industry. Here is an absolutely new industry, free from all traditional methods, bringing into being a product which has the world as its market, and a product and a production that lends itself nicely to almost complete standardization. The outcome could be little else than a far reaching change upon those who do the work in this gigantic industry.

The aim of this paper is to list and briefly analyze the nature of the changes that the development of machinery has brought forth in the automobile and closely allied industries.

Before turning to the automobile industry proper, it should be noted that the antecedent industries of the automobile—the blast furnaces, the open hearths, the rolling mills and the foundries—have all passed through a definite revolution from hand to machine method during the last twenty-five years. The main results of this change in these industries regarding the worker are:

1. The elimination of physical labor formerly employed for the lifting and carrying and general handling of materials, product and equipment.

2. A great increase in the demand for machine operators and machine tenders whose chief requirements for successful operation are diligence, watchfulness, dexterity and such care as is necessary to direct moving machinery.

3. The effect upon wages. Wherever it has been possible to compare the old methods with the new, the results show a considerable higher, hourly rate for a larger percentage of the workers under machine operations than under hand methods. Also, in contrast to the great increase in production of a given plant that comes with the ma-

chine, the total payroll is quite often less under the mechanical methods. This condition is due to the exit by the hundreds of common labor operations, which work is performed now by mechanical appliances.

AUTOMOBILE MACHINE SHOPS AND ASSEMBLY PLANTS

The machine shops and assembly plants cover fairly accurately the operations that come within the narrower meaning of the term of the automobile industry. The analyses that follow cover these two divisions of the industry. It must be emphasized, however, that this is a somewhat limited use of the term—automobile industry. Indeed, if the reader will but refer to the August, 1924, number of *Industrial Management*, he will clearly see that the so-called antecedent plants of automobile manufacturing are becoming more and more an integral part of the automobile industry. Many ore mines, coal mines, coke plants, blast furnaces, open hearths, rolling mills, wire mills, etc., are devoted entirely to the manufacturing of the automobile, with a complete unification and co-ordination of all these plants from ore mines to automobile sales rooms.

The following constitute the more pronounced effects that machinery has made upon the workers in the industry.

THE COMING OF THE MACHINE TENDERS

The "all around machinist"—the machinist who has gone through years of apprenticeship and has finally learned his trade—finds a falling demand in the automobile industry. So complete has become the expertness of the machine itself, and so standardized have become the operations that little of experience and skill is demanded of the machine operators. Only a few days of training are needed to fit the

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worker for many of the modern lathes, milling machines, drills, multiple punches, etc. This change makes more confusing than ever such terms as "skilled, semi-skilled and unskilled workers." In lieu of unskilled, semi-skilled and skilled there now exist the *tenders* who operate machines, the *technical force* who design, plan, schedule, route and cost the work, the *clerks, inspectors and foremen* who record all the miscellaneous activities of the shop, check the quality and quantity of production and who keep watch on the flow of material.

The ability to meet ("to hit") and maintain a constant machine pace; to be able to eliminate all waste and false motions; to follow without wavering printed instructions emanating from an unseen source lodged in some far off planning department—these constitute the requirements of a successful machine tender. The percentage that his actual production is below the standard production set for him is the measurement of the specific tender's inefficiency. And this percentage is more closely related to the conditions of his home life, his health, and his financial problems than to any academic classifications of skilled, semi-skilled or unskilled worker. As a superintendent in the Ford plant expressed it:

To attain a normal day's production the worker is timed so as to keep up an energetic gait for eight hours a day—this can only be done when a well-regulated living is carried on by the worker in his home life. Worry, careless living, drunkenness and sickness must all be eliminated if the employe is to maintain his high grade production in this plant.

The following classification of the more important operations in the automobile industry is needed in order to obtain the proper perspective of machinery and its effects.

GROUP I. THE MACHINE TENDERS

This group embraces operators of boring mills, drill presses, lathes, milling machines, polishing machines, punch presses, screw machines, sewing machines, planers, shapers, sheet metal machines and a host of other miscellaneous machines. Roughly, it represents from 25 per cent to 40 per cent of the working force.

GROUP II. THE ASSEMBLERS

This group, although not quite as highly paid as the men in Group I, must in the performance of their work carry on operations that are much like those of Group I. By the use of mechanical appliances and tools, working on standardized product according to definite and standardized motions, they follow very closely the activities of machine tenders. There is, however, more physical work connected with the assembly operations. This group totals from 10 per cent to 15 per cent of the working force.

GROUP III. "SKILLED WORKERS"— THOSE WHO HAVE A TRADE

This group embodies machinists, blacksmiths, die sinkers, painters and varnishers. It includes somewhere between 5 per cent and 10 per cent of the workers.

GROUP IV. INSPECTORS AND TESTERS

These men test and inspect the work at different stages of the operations and also test the finished cars. They will total about 5 per cent of the working force.

GROUP V. THE HELPERS

The duty of this group is to assist those workers embodied in the above groups. It covers varnish rubbers, trim bench hands, machinist helpers, blacksmith helpers, etc. This group represents about 15 per cent of the total working force.

GROUP VI. THE LABORERS

This group embraces those generally classified as common laborers. They are the lowest paid workers and are called upon to do such carrying, handling and clean-up work as is generally required of such workers. They will total around 10 per cent to 15 per cent of the workers.

Over a period of eleven years, 1912-1923, Groups I and II, the machine tenders and the assemblers, have increased considerably in the percentage of total workers. Groups III and VI, the skilled workers and common laborers, have greatly fallen off in percentage of total workers.

In one of the most modern of plants over two hundred different kinds of mechanical devices are found carrying and conveying materials and product. This same plant reported that the percentage of trade skilled employes had been more than halved during the last ten years.

Here, then, we find skill or long experience at the top and brawn at the bottom both greatly lessened. A lessening which has meant on one side a transfer of skill from the trained workers into intricate and complex machines; and on the other side the brute force of physical labor transferred into the powerful and gigantic lifting, carrying and conveying ma-

chines. The natural concomitant of this is an increase in number and percentage of those who must operate or tend the machines and mechanical appliances.

MACHINERY AND WAGES

The important development taking place in the automobile industry within the last twenty years and briefly suggested above, is:

- (a) The growth and development of automatic machines.
- (b) The growth of machinery for handling and conveying material and product.

This explains the entrée of machine tenders, assemblers and the corresponding displacement of both skill and common labor types. Changes in wages naturally are a part of changes in operations such as the above.

The following table gives the average hourly earnings of the different groups.

GROUP CLASSIFICATION OF WORKERS AND AVERAGE HOURLY EARNINGS¹
(Male Employes only)

GROUP NUMBER	TYPE OF OCCUPATION	NUMBER OF REPRESENTATIVE ESTABLISHMENTS	NUMBER OF WORKERS	AVERAGE HOURLY WAGE RATE	INCREASING OR DECREASING PROPORTION OF WORKING FORCE
I.....	Machine tenders	39	12,332	.68	Increasing
II.....	Assemblers	40	4,631	.66	Increasing
III.....	Skilled workers (trades)	34	2,360	.84	Decreasing
IV.....	Inspectors and testers	31	4,043	.61	No conclusive data
V.....	Helpers	23	653	.56	No conclusive data
VI.....	Laborers	24	2,307	.46	Decreasing

¹ *Wages and Hours of Labor in the Automobile Industry*, Bull. 348, U. S. Bur. Lab. Stat. Pub., Oct. 1923.

It should be noted that Groups III and VI represent the highest and lowest paid groups respectively and that Groups I and II are between these extremes. Also consider that Groups I and II are increasing in proportion to total working force, while Groups III and VI are decreasing. Therefore we can with fairness state that *the development of automatic and handling machinery has tended to level wages* by eliminating the high and low wage groups and increasing those who represent a middle grouping.

By referring to Bulletin 265, U. S. Bureau of Labor Statistics, May, 1920, the same general tendency can be seen from an analysis of wages data in that volume.

Approbation from fellow-workers and self-aggrandisement are denied the workers because of automatic machines and standardized operations. This constitutes the real bug-bear of the whole machine industry. The regular, rhythmic stride of the machine absolutely precludes the worker from showing off his individual ability in any definite field of activity. Automatic machines put padlocks on self-expression. The work of a modern machine-tender leaves nothing tangible at the end of the day's work to which he can point with pride and say "*I did that—it is a result of my own skill and my own effort.*"

Practically all parts of the product have been so specialized in operations that no definite, tangible object can be shown as embodying the work of a specific individual. Man no more marvels at the nature of the labor effort expended in the automotive industry. He stands dumbfounded, however, before the complexity and intricacy of the machines. The author has guided hundreds of students through automobile plants. What interests them is the marvelous automatic ma-

chine. The labor effort scarcely arouses their attention. The words of Mr. Dexter Kimball find application in the modern automobile plant:

Automatic machines show a transfer of thought, skill or intelligence from person to machine. These principles of transfer of skill and transfer of thought lie at the bottom of modern industrial methods.

In contrast to the machine-tenders we notice the hand workers—men working at their trades—do gain an appreciation. The artisan is looked up to and admired by those who watch him and by his helpers and apprentices. The die makers, the hammermen, the painters doing the higher grade of work, the older type of machinists seldom fail to have their work commented upon. These workers carry a proud air of knowing all the "ins and outs" of their trade. With great pride a machinist showed me two steel blocks smoothed by hand tools to such an exactness that by cohesion one block lifted the other.

Even a casual survey of these "trade" or "skilled" workers in industry will quickly acquaint anyone with these—shall we call them—*psychic rewards* of appreciation that come to this smaller and fast-vanishing group of workers. Being human, they like this sort of thing. It constitutes a definite return for labor effort expended. It means much in the way of developing and maintaining self-respect. This definite return to workers the complex, automatic machinery denies. And just so long as automatic machinery holds from the worker the opportunity for showing or expressing to some degree his own individuality and ability, then just so long may we expect him to be unconcerned about his job save for the money he can get out of it. Time studies, measured production and portrayed unit costs may keep the workers energetic and nervously "on their toes,"

but it is with great difficulty that the workers can be aroused to wholesome interest or spirit.

Changes in wage systems come with automatic machines. The development of a uniform, standard production turned out by machines, whose capacity per day is measurable, lays the basis for paying on a standard production basis. This differs from the ordinary piece work. The standard job or days work, which quite often is the machine's normal output, constitutes the base upon which all manner of premium, bonus and reward plans are built.

It is important to note that standard output under large scale production is the resultant uniformity that comes with automatic machinery, which, briefly stated, means that automatic machinery is the foundation for most of our successful time studies and methods of pay built upon such studies.

Automatic machinery has changed management method. By the introduction of machines whose operations and outputs have become uniform, standardized and automatic, the labor effort thereby is rendered measurable. In addition the growing speed with which metal can be cut and the machines operated, places emphasis upon the problem of quick dispatch of materials to and from the machines, and through the plant.

The first of these significant changes has resulted in placing upon management the responsibility of inaugurating measured production and pay plans for the workers. Once this is inaugurated the workers are controlled by a measured amount of work to be performed in a given time. Measured production tied up with adjustments in the pay envelope means that management needs little else to induce the worker to productive effort. The worker soon realizes that he is not only being measured but that this work is a link in a

long chain of operations, which link, if it does not function properly, is quickly noticed by management and by other workers.

The need of quick, material handling has led to many kinds of machinery for intra-plant transportation. As a result of this faster production, foremen are charged with the difficulties of having material flow smoothly and swiftly through the shop. But the measured production and the rapid flow of material through the plant call for the work of planning departments with their corp of technicians and clerks. This department plays an important part in the automobile plants as it originates the directions and instructions covering the productive operations.

THE ONWARD MARCH OF MACHINERY

He would be a rash and reckless prophet who would hold that the development of machinery in the automobile industry had reached its zenith. Automatic machinery so-called is not completely automatic until it has removed the necessity of all human effort. Probably the furthest development in this respect has been reached in transporting electric power, where sub-station operations are entirely automatic, save for occasional inspection, oiling or repairs. No labor effort is needed to operate. In the automotive industry the direct operations of cutting, bending and shaping were the first to be transferred to the automatic machine. This was followed by the further transfer of feeding by hand to mechanical feeding. Soon a further development took place by the use of conveyers, endless belts, etc. And lastly a fourth development whereby machines are being built in batteries so that many machines are under one man control.

Regardless as to the ultimate place

the machine method will take us—if there be an ultimate place—this important fact comes to our notice: Mechanical changes are taking place at an extraordinary rapid pace. The entire machine age comparatively speaking is indeed a very short one—not more than a hundred and fifty years and in America scarcely more than a hundred years. And in the last twenty years the growth of automatic machinery has made greater progress than it did in the preceding hundred years. Before this very sheet upon which I am writing reaches the reader in final printed page, many machines which are heralded now as the latest improved devices will have become obsolete and cast aside as junk.

When we realize this rapid pace of mechanical progress, then the effect upon the workers calls attention to Samuel Butler's words from *Erewhon*

Reflect upon the extraordinary advance which machines have made, and note how slowly the vegetable and animal kingdoms are advancing. The more highly organized machines are creatures not so much of yesterday as of the last five minutes, so to speak, in comparison with past time.

Quickly—over night as it were—the machine, gigantic, complex and intricate, has removed the need of muscle and brawn. As Fredrick W. Taylor puts it, "The Gorilla types are no more needed." Instead we have a greater demand for nervous and mental activities such as watchfulness, quick judgments, dexterity, guidance, ability and

lastly a nervous endurance to carry through dull, monotonous, fatiguing, rhythmic operations.

Beyond these changed conditions, however, rests the larger problem, who shall share the results of this great advance in machinery? Shall it be a Mr. Ford, a Mr. Durant, or a Mr. Jordan? Shall it be the consumer who constantly is buying a better car at a falling price? Or shall it be the workers who are being shaped physically and mentally by these machines? All of these interests perhaps in one way or another are now reaping some benefits from the progress of the industry. This much however seems clear and justifiable: That a first charge against the great productive increases that machinery has made possible are such costs as will fully and adequately reward the worker whose life is being rigidly shaped by this machinery. Shorter hours, higher wages, adequate insurance to cover death, accident, health and old age are preferential charges to be met before profits and lower prices are made available.

Higher standards of living, shorter hours of labor, a further development of art and a greater degree of leisure are possible and near at hand as fast as man enslaves the machine for his welfare.

But the success of the machine must not only be measured by the goods it creates. We must see to it that those who build and operate it share in a greater happiness because of this master giant now in our midst.

Financing the Sale of Automobiles

By J. A. ESTEY, PH.D.

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THE tremendous increase in the number of automobiles since the war has done more than strain our highway systems and congest our cities; it has brought in its train a financial problem of no little complexity and magnitude. Financing the orderly marketing of such a volume of costly commodities through a multitude of small dealers, often ill-supplied with capital, would in itself be an intricate task; but the burden has been greatly increased by the additional necessity of selling on the installment plan to the vast army of consumers. For a satisfactory means of supplying working capital to manufacturers and dealers who sell on the installment plan has always been difficult to devise, and has commonly necessitated the organization of a specialized type of financial institution, adapted to the needs of the business. The sale of pianos, agricultural implements, furniture and electrical appliances have become to a very large degree dependent upon the aid of the commercial credit and discount companies that supply the working capital of the dealers.

In the motor industry similar problems have led to a similar development, and the methods of credit and discount companies have been adapted and extended by the rapidly-growing institutions that have arisen to finance the distribution and sale of automobiles.

THE PROBLEM

Even a hasty survey of the working capital requirements of the dealer in cars discloses the fact that the retail car dealer not only needs more credit, but he needs it more intensely than the

average distributor of merchandise. In the first place, if the vast and expensive capital equipment of the manufacturer is to be profitably employed, the production of cars must be reasonably continuous. Unfortunately for this purpose, the sale of cars is subject to great and unavoidable seasonal fluctuations that are more serious than any correlated variations in the output of cars and that have only been partially reduced by the use of closed cars. Hence somebody must undertake to store the excess of cars during the slack season; and the dealer usually has to do it. For the manufacturers have no storage space for such a multitude of goods, and even if they had, they could not use it, since the cars must be distributed throughout the market before the seasonal demand emerges, if hopeless congestion is to be avoided. So that, as in the case of similar goods, such as agricultural implements, it is the dealer who must undertake the function of storage, and this calls for an amount of working capital that is usually large. The great increase in the number of car styles is making this working capital even larger.

In the second place, as motor cars have become cheaper, installment sales have come to cover the greater proportion of the field, and this heaps new financial burdens upon the dealer. Before the advent of the cheap and medium-priced car, the buyer was commonly a person of means who paid cash. He did not expect terms, and they were not offered. But the vast spread of motoring, the unprecedented output of small, cheap cars, the growing realization of the economy of cars

for business purposes, the great increase in the use of trucks and tractors; all these have put the automobile into the hands of people who, for various reasons, do not desire to pay cash. In some cases, the buyer has not the funds; in others, because he uses the car in his business, he prefers to pay for it out of the current earnings it doubtless will produce. So that the dealer, even when he has financed his purchases of cars, is confronted with the additional task of carrying the installment notes of the ultimate consumer. And, as in all installment business, this is the more difficult problem.

In the third place, when the dealer appeals to the bankers for financial aid, he commonly finds great difficulty in obtaining adequate accommodation. He finds that he is looked upon as not the best of credit-risks, and his business as one not well adapted to the ordinary routine of finance to be found in commercial banks. And it is a fact that banks are not equipped to finance the peculiar capital needs of automobile sales. The risks involved are not necessarily very great, but the business does not measure up to the ordinary standards of credit analysis. Many of the dealers do business on a very small capital of their own, despite their costly stock. They often want funds for longer periods than customary, and they want to pay back in installments, which are a nuisance to handle and necessitate a degree of supervision the banks are unwilling to give. The chattel security in the car they regard as subject to abnormally heavy depreciation with the possibility of additional loss in case of repossession. And, finally, the investigation in regard to the credit standing of the installment-plan customers is more arduous and more costly than that usually undertaken by banks.

THE AUTOMOBILE FINANCE COMPANY

Such being the situation of the dealer, it is evident that, in the absence of special financial facilities, the business of marketing cars—and indeed of producing them—would be sadly hampered.

Fortunately, the banking organization seems always to have had enough vitality to adapt itself to changing needs, and in this case, as in others, the demand for accommodation has elicited an adequate response. So we have the spectacle in the last few years of a great outburst of institutions dealing in automobile finance. Some of these were established credit companies that have reached out into the newer field. But many, many new auto credit institutions have been established, and a few have been set up by the producers of motor cars who saw therein a means of keeping open the channels of distribution for their rapidly increasing output. All of these model themselves more or less upon the familiar finance, discount or credit company that has operated for years in the field of installment sales and the discounting of receivables. And their particular rôle in the scheme of finance is to act as an intermediary between the commercial banks and a type of customer who does not have the business and cannot furnish the kind of security that bankers can heartily endorse.

The work of the auto-finance company is commonly divided into two parts: wholesale financing or aiding the dealer to buy cars; and retail financing, which enables him to sell them on the installment plan. The company not only advances funds to a dealer who, with a modest capital of his own, wishes to put a stock of cars on his floor, but when sales are made on credit and the dealer has to face the additional difficulty of awaiting partial payments,

the company finances him again for the interval covered by the installments. As probably 60 per cent to 70 per cent of all passenger cars and 90 per cent of all trucks and tractors are sold on credit, most dealers will require this double accommodation.

Many finance companies are prepared to offer either wholesale or retail aid. Some, particularly the numerous, small, local companies, limit themselves to the retail field, and merely advance on the installment notes of the ultimate buyer. Apparently no company specialises in wholesale finance only.

WHOLESALE FINANCING

In wholesale financing, advances are made to the dealer upon his promissory note or acceptance, fortified by the collateral security of the car. The amount of the advance averages about 66 per cent of the value of the car, though some run as high as 90 per cent, some as low as 50 per cent. Usually the percentage will be higher for passenger cars than for trucks, and for cars stored in a public warehouse than for cars kept on the dealer's floor. The loans run for various lengths of time, the most common being 60 or 90 days. For the additional protection of the finance company, the notes of the dealer are often indorsed or guaranteed by the manufacturer of the car. Sometimes the manufacturer agrees, in case the dealer defaults, to repurchase the car and pay all expenses. Many car makers are apparently willing to indorse in order to aid in the orderly marketing of cars and in keeping the channels clear for regular output. But this practice is not universal. Some finance companies do not or are not able to demand it. Some manufacturers—Ford, for example—will not do it in any case.

The physical collateral behind the

dealer's obligation is the car itself. When the car is placed in a public warehouse, the warehouse receipt is made out or indorsed to the finance company. If cars, on the other hand, are placed on the dealer's floor, the dealer may execute a chattel mortgage, or the car may be held under a lease agreement or conditional bill of sale, the particular security used depending largely on the state where business is done. In all cases ample provisions protect the lender against misuse of the security by the dealer—as for demonstration purposes—and immediate repayment of the loan is generally required in the event of the car being sold.

Just what will be the aggregate credit extended to the dealer will depend upon considerations such as rule in orthodox banking. Though the collateral in the cars, protected by ample provisions, might seem in itself to measure the total volume of advances, the integrity of the dealer must be taken into account. Fraud and deceit may still arise in the use of collateral security and, as in all banking, the credit statement of the dealer, checked by some investigation of his business reputation, plays a large part in determining his time of credit. This is true, even though the car is eminently saleable, and the dealer is backed by the indorsement of the manufacturer.

RETAIL FINANCING

Retail financing differs only in detail from wholesale. In this instance, the obligation arises out of the purchase of the car by the consumer. In the average plan, the buyer pays cash sums varying from 30 per cent to 50 per cent of the price of the car, and gives for the deferred balance a series of notes, or a note with a schedule of payments, calling for a certain number of monthly installments. Payments are spread over various periods of time ranging

from five to sixteen months. The notes of the purchaser are as a rule indorsed by the dealer, and it is upon them thus indorsed that the finance company makes its advances. The dealer is thus able to shift the burden of carrying his customers. He virtually gets cash for every sale, frees his capital for further uses, and, as the installments are usually paid directly to the finance company, is relieved of the burdensome details of supervision and collection.

As in wholesale financing, the finance company is protected by a lien upon the car which, as before, varies in form from state to state. In some states a chattel mortgage form is used and title passes to the purchaser of the car. In others, this is replaced by a conditional bill of sale or a lease agreement, whereby the title remains with the finance company and only passes to the buyer upon fulfillment of all the conditions stipulated in the contract. Cars, however, under this plan are being placed in actual service, and, being thus exposed to the ordinary accidents of use, necessitate additional provisions to meet the risks involved. The most notable of these is the requirement of insurance against theft, fire and collision, the cost of which is often included in the charges levied on the buyer. In some cases it is a separate charge the customer must meet, but it is always there, and often it adds to the profit of the lenders through the commission they obtain for every policy placed. The normal depreciation of the car is amply covered by the large initial payment and rapidly recurring installments. Indeed the security covering the unpaid advance rises continuously, relatively to the indebtedness.

But even with this excellent collateral security, credit must be granted with proper caution. Irresponsible people are not good credit-risks under

any circumstances; and to guard against the danger of excessive repossession all companies attempt to assess the credit standing of every buyer who makes time payments. Such statements as are demanded from the buyers are much less complicated than those used in commercial banking, but they do attempt to obtain valid information on bank accounts, property owned, free or encumbered, and the source of income from which payments on the car may reasonably be expected. Perhaps the information thus elicited is not as full as could be wished, but it is demanded, and indeed doubly demanded. For not only does the finance company make its customary investigation, but the dealer, in order to protect the indorsement he will be expected to add to the purchaser's note, is quite as much interested in a credit survey, and usually makes some investigation of his own, possibly through his local knowledge adding what the agents of the finance company may not be able to discover.

SOURCES OF FUNDS

The funds with which the finance company supplies the needs of the dealers come from various sources, as do those of any company. The initial funds are supplied by the proprietors of the company and various additions may be made to these as profits are turned back into the business. But the great bulk of their resources, three, four or five times their owned capital, is obtained by borrowing, and most of their borrowing is from the commercial banks. Their business brings into their possession large volumes of promissory notes, usually double-name paper, secured by merchandise collateral, that are highly negotiable when given the additional backing of indorsement, and their cash resources can be enormously augmented either by the

sale of these notes to banks, directly or through brokers, or by depositing them with a trustee, and issuing thereupon their own collateral trust notes to be marketed through the usual channels.

Smaller concerns rely heavily upon direct loans at banks, the amounts depending on their capital and the integrity of their directors and officers. But the larger concern tends to adopt more and more the practice of issuing collateral trust notes of short duration and in denominations of from \$500 to \$100,000. These are offered to banks at the rates for good commercial paper, or perhaps a little higher, and disposed of, usually, with little difficulty. The collateral itself carries the indorsement of the finance company, and usually shows a margin of 20 per cent, and the banks are inclined to regard the collateral trust notes issued thereon as a good investment. The rate, too, is usually attractive and the maturities of conveniently varying lengths, commonly 60, 90, and 120 days.

It is thus evident that the ultimate source of the working capital needed for the distribution of automobiles is very largely the commercial bank. Only it has been necessary to set up this intermediary organization of the finance company between the banks and a business they distrusted, to the end that a guarantee of respectability and fair credit-risk might be secured. For, after all, working capital requirements and short-time loans must inevitably be taken care of by the appropriate institutions therefor. And commercial banks have been drawn in because it is their own sphere of business and they could hardly keep aloof. It is only a question of devising the proper machinery. Banks may not be willing to lend railroads wherewith to buy equipment, but they will undoubtedly invest in equipment notes issued by a car trust. They may be loath to

finance the sale of live stock, but they may quite properly regard the obligations of the cattle-loan company as an admirable investment. Similarly, though the sale of automobiles on installments may not attract the immediate aid of banks, they have no objection to lending on the security afforded by the automobile finance company.

THE COST OF SERVICE

The automobile finance company is thus really an intermediary. It may be called a bank and be chartered, as some are, under state banking laws; but it is essentially a machinery for investigation, indorsement and guarantee, and for the pooling of many petty securities. And this is important to remember in judging of its value to society and of the costs of its services. For it has undertaken a job which may involve no little expense, and need a corresponding reward.

Indeed the expenses are not small. The investigation of the credit standing of a multitude of small business and non-business people, the handling of the chattel security, the scrutiny and supervision demanded by the method of repayment, in some cases the additional cost of insurance, in others the cost of foreclosure and repossession, constitute a considerable burden of expenses which the borrower must pay. Add to these the interest on the loan, and some compensation for the risks involved, and the charges must obviously rise higher than the customary levies of commercial banks. True, the risk in ordinary times is not excessive, for relatively few cars have to be repossessed—not more than 1 per cent of the total—and the percentage of overdue accounts ranges from 20 per cent down to as low as 1 per cent, depending on the company. Indeed, ordinarily the expense incurred is in maintaining

the machinery for avoiding loss rather than in the loss itself. Still the risk is there, and it may materialize sometimes with dangerous rapidity. Any considerable volume of repossession, such as would make sales difficult and render assets unrealizable, would be a serious matter. Such a calamity might happen to any badly managed company, particularly the small local company too eager for business and not sufficiently rigid in credit investigation. It might happen to all companies in general in a severe business depression when vast numbers of cars are sacrificed. What this means is fully illustrated by the difficulties of 1921-1922.

Keeping in mind this background of the finance company's costs, one might ask in conclusion what is the usual charge for their advances. On the average, they charge about 15 per cent on the funds outstanding. Whether it could be lower than this is conjectural, but it is claimed that 12 per cent is the lowest rate consistent with the making of profits. Many companies charge more than 15 per cent; some charge as high as 36 per cent under some circumstances. Often the rate is concealed by the peculiar methods of

repayment commonly adopted. When interest is charged for the whole time of the loan on every installment, no matter whether paid back in one month or in twelve, a nominal rate of 8 per cent or 9 per cent may work out at 15 per cent or 20 per cent in practice.

In short, the method is not cheap. Perhaps it cannot well be cheaper, all things considered; but the buyer of cars who can command money at any rate less than 15 per cent could afford to borrow and pay cash for his car. That more do not do so may be because they do not realize what the installment plan costs. But there will always be multitudes of buyers who for material or psychological reasons prefer time payments, and on their trade the finance company will continue to thrive. Certainly the enormous and increasing number of sales on credit would seem to prove that auto-finance companies are only responding to a lively and insistent demand. In any case, one must not only admire the ingenuity with which they have gone about to perfect their peculiar type of finance, but one must recognize that they have added one more permanent unit to our complicated financial organization.

Financing the Automobile

By HENRY G. HODGES, PH.D.

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FROM the figures obtained by an association of the larger automobile finance companies, allowing for an additional fair estimate of the business done by the unassociated companies, it seems reasonable to conclude that there were in the neighborhood of two million automobiles financed in this country last year. With an average financed amount of \$500, we secure a vision

basis of our particular phase of the subject when we realize that \$1,000,000,000 worth of retail financing was done by these companies in 1923. This amount is increased by approximately \$150,000,000 advanced to the automobile dealer. These loans to the dealer have much shorter maturities than the notes of the retail purchaser.

FINANCING THE DEALER

Automobiles are shipped by the manufacturers to the dealers, or to their large distributing agencies, with drafts attached to the bills of lading, through the local banks, which collect and remit to the manufacturers. If the dealer can finance himself or secure sufficient credit from his local banks, he does not deal with finance companies so far as his own purchases are concerned. If, however, his credit facilities are limited, as they often are, the dealer looks to the finance companies for assistance supplementary to that obtained from the banks. This is particularly true during the three winter months when his stock must be large if he is to be in position to make prompt deliveries to the spring and summer trade. The usual plan is to have the finance company advance from 75 per cent to 85 per cent of the dealer's cost of the automobile, and to take title to the automobile to secure the loan. The average charge for this accommodation is about $3\frac{1}{2}$ per cent to 4 per cent for three months, which charge includes the cost of fire and thrift insurance on the car. The policy is held by the finance company to protect its interest in the security. This plan enables the dealer to prepare for future business to an extent that the usual banking facilities will not provide. The automobile which secures this account is either left with the dealer as "bailee," for display purposes—the so-called "Floor Plan"—or is stored in a bonded warehouse in the name of the finance company.

THE RETAIL TIME SALE

In an even larger percentage of cases the retail buyer needs help in buying his car. This figure has been generally accepted as 70 per cent of the number of cars sold, and in the case of the

cheaper cars the average is much higher. When the amount of business was small the dealer could probably take care of his notes receivable through his bank. But as the business grew, these customer notes went far beyond the dealer's ability to discount. The finance company was called into existence by the insistent desire for an increased distribution. For this phase of the business the finance company supplies the dealer with all the necessary forms and instructions. The retail purchaser's note is made out directly to the finance company or to the dealer and assigned or assigned and endorsed by him to the benefit of the finance company which discounts the note. The retail buyer pays from one-third to one-half the selling price of the car. To the balance is added the finance company's charges. This total is divided into from six to twelve monthly payments, which are made direct to the finance company by the retail purchaser. Included in the charges are interest, service and insurance. The service charge covers the credit investigation and the cost of collection. These items are of the same general nature as those of a commercial banking transaction, but they are pursued more thoroughly and in a detail commensurate with the risk involved. The cost of collection is considerably more than is the case in the ordinary banking transaction. The investment is being paid for out of earnings; there are a number of monthly installments; the borrower often is a considerable distance from the lender; the lender has an insurable interest in the security and must become the active party in the event of an insurance adjustment. The insurance item depends on the plan of the finance company, but always includes fire, theft, transportation, and a fraudulent conversion bond. In many instances there is, in addition,

collision insurance against losses in excess of \$100.

In addition to these precautions against possible loss, at least two of the larger finance companies have insured themselves against loss on "repossessed" cars. This rate is fixed by private arrangement between the insurance company and the finance company, and is usually a flat charge per car. It is a foregone conclusion that the insurance company must charge the "probable loss" in addition to overhead and a profit. So it is generally understood that finance companies using this method of insurance do so to increase their own borrowing capacity. Large finance companies can carry this risk more cheaply than the insurance companies can carry it for them. The loss ratio on this class of business does not average more than $\frac{1}{2}$ per cent of the volume in carefully managed companies. In the smaller companies the loss ratio will have a much wider range. It will depend more directly on the caliber of the personnel, simply because the spread is smaller. In some of these smaller companies the loss ratio is as low as $\frac{1}{10}$ per cent, while in others it has forced liquidation.

THE FINANCE COMPANY

The popular conception of the finance company is coming more true to form every year, as a growing clientele "partake of its blessings." It has been viewed by many as a pawn-shop plan of unthrifty automobile purchasing. The picture includes a poor working man, buying something that he cannot afford, at the solicitation of a prevaricacious salesman, with an unscrupulous finance company in the background, ready to add disaster to an already impossible situation. The several elements in this picture must be subjected to softening tones to bring them to a fact basis, and produce the true picture of

blending interests in place of the contrasting selfishness of the other. As a matter of fact the business man, who can well afford the first cost and operating expense of a \$5,000 to \$8,000 car, seldom has the cash lying in bank to cover this purchase. He gives his promissory note to the dealer who has it discounted through the buyer's bank, or he has his own note discounted and pays the dealer with borrowed cash. Reductions on his note are in effect installment payments. Furthermore, these reductions are met with surplus income, the same general scheme carried out in the case of the popularly known "financed" car. The only difference is that the "business man" buyer has access to regular banking credits for this purchase, as well as his business transactions, while the "financed" buyer does not have such a commercial banking opportunity.

With these attitudes of the general public, the dealer, the time-payment automobile buyer and the banker, it may be realized, without any undue stretch of the imagination that such finance companies as operate successfully in this new field for a period of five years, let us say, have had many obstacles to overcome. With the survivors doing an increasing and successful business, we must look for the cause in some form of service not included in the casual conception of their function in our financial structure. We must admit that many companies have done and are doing considerable harm to an industry that sorely needs the best attention of capable minds, due to its infancy and size. A pertinent side-glance at the mortality of the finance companies is suggested in a quotation from the *Eastern Underwriter*, an insurance journal:

A list of finance companies was made up not long ago and they numbered 600. This paper asked an authority on this

subject how many of these would rank as permanent going concerns with a sound financial foundation. The answer was fifty.

ECONOMIC FUNCTIONS OF THE FINANCE COMPANY

It is distinctly a service that the finance company has to sell. This service, we will try to point out, maintains a nice balance among the manufacturer, the dealer, the bank and the ultimate consumer, in a system which would never have grown so rapidly, on such a firm basis, if it were not for the interposition of this service-adjuster. In the first place it is fair to assume that the manufacturer of automobiles would not be able to finance the dealer during the unseasonable selling period. If he did, he would be compelled to carry for three or four months an enormous stock of finished cars awaiting the dealer's spring demand, or he would have to ship to the dealer on open book account during this period. In either case the problem for the manufacturer would be the same, and one which he would not be able to cope with. It is certainly safe to say that no manufacturer could successfully solicit bank assistance to carry an unsold stock of finished cars, on a year-round production basis, for a period of four months. It is within recent memory that even the Ford Motor Company was credited with "dumping" its entire finished product on its dealers in a dull selling period, due to financial pressure. Finance companies all over the country relieved the dealers of the pressure caused by this dumping transfer of frozen credits.

The banks do not look with favor on automobile financing for the dealer, except as his known business ability or tangible assets warrant extension of a credit which is certainly limited. This would be the natural consequence in any new line when estimated by our

most conservative appraisers—the bankers. The very circumstances of the case created a need for some new credit medium, and the new finance companies supplied it. If they had not filled the need at this point, and the manufacturer found it impossible to carry the frozen assets of stored automobiles, there would be just one answer. Production would be kept down to meet the seasonable demand conditions, with the consequence that the price of the automobile to the consumer would be kept at the high price of five or ten years ago. Thus it was that the finance companies bridged the gap and made possible the continuous and increasing production of cars, which was responsible for their continually decreasing cost. The manufacturer can base his year's production on the estimates contained in his dealers' contracts, and spread that production evenly throughout the year. He can ship cars to his dealers as they are *made* and not as they are *sold* by the dealer. The finance companies absorb the credits which the manufacturers cannot carry.

In the same way the dealer is, in his turn, helped in the distribution of the credits demanded of him by the retail purchaser. The banks will not take the paper and the dealers cannot. By handling these retail credits in large groups the finance company not only relieves the dealer, but the loss ratio is distributed as between localities, dealers and makes of cars. In this phase of the work the finance company not only absorbs what would otherwise be a frozen credit in the hands of the dealer, but it performs another important service by the credit and collection facilities it brings to the assistance of the dealer. The banks are not prepared for this service from the standpoint of training or equipment. These new agencies made this work their

business, and necessity compelled a rapid and thorough training for those that would survive. Leaving out of account the economic desirability of the automobile purchase by the consumer, the note which is a part of the purchase is to be met from his current income. It therefore becomes important to get information on this phase of the note-giver. The finance company goes even beyond that. It considers the intrinsic value of the automobile itself, as well as the financial responsibility of the manufacturer and the dealer. All these items have a direct bearing on the value of the notes offered. Such a searching examination is not only a benefit to the finance company involved, but it is a benefit to the entire automobile industry, since it acts as a continual weeder of those on the margin, both among the manufacturers and the dealers. This process always operates to the benefit of the purchaser. He is more likely to have an automobile which will continue to be manufactured at a reasonable price, together with service from a dealer who will continue to be a dealer. Nothing about our present banking system would lead us to believe that we could expect from it such a co-ordinating benefit.

In addition to this service which goes *before*, there is the very important service which comes *after* the sale of the car. For this the dealer and the bank is even more unfitted than for those functions outlined in the preceding paragraph. The note usually covers ten or twelve monthly payments. This is a longer period than is customarily allowed on time paper by the banks. Again, the maker of this paper is not accustomed, usually, to banking practices, and the banker is not trained to collect this type of installment note. Such a situation potentializes a friction which will court loss to all concerned,

and particularly to the dealer. Delinquent payments must be followed up with machinelike punctuality, but with a peculiar adjustment of the human element that will protect the dealer's future business. Then if it becomes necessary to repossess the car securing the account, an organization to handle resales must be at the command of the financing agency. Here again the impossibility of the bank doing justice to the collection of this type of account suggests itself.

An excellent graphic illustration of the absorption of credits by the finance company is borrowed from an explanation of the subject by Emlen S. Hare.¹ See page 54.

REDISCOUNTS

It is not customary for the finance company to operate entirely on its own capital. In fact, when an efficient operating organization has been whipped into shape and has produced results, more business will flow to the company than it can usually take care of from its capital investment. At this point the organization is able to take on additional business with an increasing net return, if outside capital can be had at reasonable rates. The finance companies turn to the banks. There are probably numerous ways of obtaining this additional working capital, but three methods are commonly employed. The company may have its own corporation notes discounted directly, or it may sell its commercial paper, with varying maturities, through commercial paper houses which sell to banks. This type of commercial paper pays an attractive rate, and is considered a safe, temporary investment for the bank.

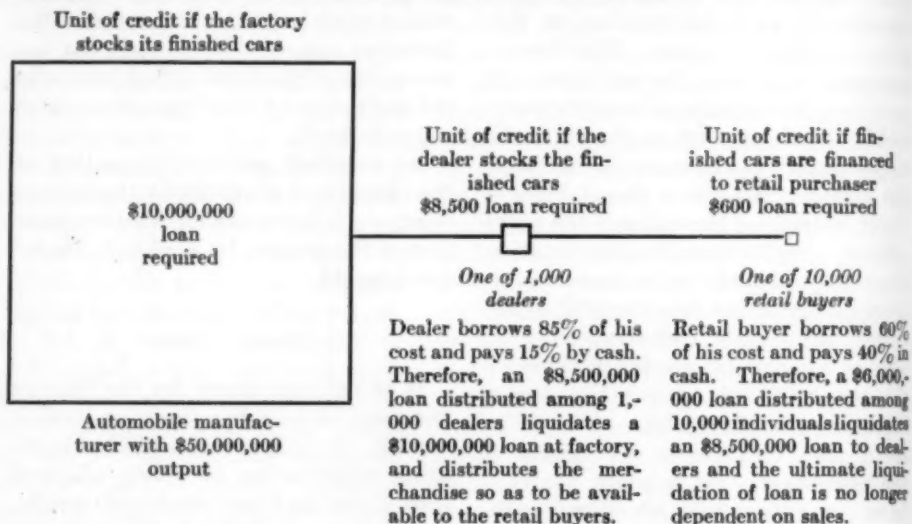
¹ Mr. Hare is Vice-President of Hare & Chase Inc., of Philadelphia, a company engaged in the financing of automobiles in a number of eastern and middle western cities.

HOW THE AUTOMOBILE FINANCE COMPANY LIQUIDATES CREDIT AND SAFEGUARDS IT BY SPREADING THE RISK

The seasonal nature of automobile buying necessitates borrowing by automobile manufacturers or dealers, or both.

No attempt has been made to verify the figures used below as the object is merely to present a condition which must always exist to a greater or less degree.

The following illustration assumes that the automobile manufacturer with a yearly output of \$50,000,000 will require a loan of \$10,000,000 during the winter months.



As some 70% of the public desire to buy on time, any credits extended to manufacturers and dealers are hazardous and immature, unless a means of buying on time is afforded the public.

Some of this paper pays as high as 7 per cent.

Again, the finance company may give its corporation note secured by its retail-purchaser and dealer notes receivable. Often the bank is made trustee for these receivables, the finance company agreeing to substitute other notes of equal or larger amount, or cash, for any note taken from the trustee bank. These substitutions occur whenever any customer of the company liquidates an account. The bank may agree to advance the company from 50 per cent to 75 per cent of the total balance due on its trustee notes. In view of the fact that there is more than an ordinary service in this bank loan, a rate is fixed, through the carrying of cash balances by the company,

which will adequately compensate the bank for its loan and service.

The third method is for the finance company to arrange for a straight rediscount rate on its customer notes with a bank in the territory where these notes originate. In this case the original maker of the note is notified by the rediscounting bank to make payments to it direct. The bank thus acts as a *receiving agency* for the finance company. In its endorsement the finance company agrees that, in event of any installment not being paid on the day on which it is due, such installment shall be subtracted by the bank from the finance company's balance. Then the company must get on the job as the collecting agency—a detail which the bank is not prepared to

handle. In this case the bank renders a small item of the service included in the finance company's work, and is compensated accordingly. Sometimes there is a flat amount allowed the bank, in addition to the interest, on each note so handled. Another plan is to allow the bank a preferential rate—as high as 9 per cent—to cover interest charges and the cost of receiving the installments. The margin to the company in this transaction comes from the fact that, whereas the bank figures "simple interest" on each installment for the time it is to run, the company figures its interest rate on the face of the note. Under this plan the company benefits from the possible turn-over of the installments. From the margin it must get its operating expenses and profit.

It is evident, therefore, that the greater the volume of this rediscounting the company can arrange for, the smaller will be its overhead spread on each account handled, and the greater the net profit on its own capital investment. If the company was restricted to its own capital and had a theoretically perfect turn-over, that turn-over would occur twice each year. As a matter of fact the actual turn-over on its capital will be a little better than this, due to anticipations on some of its customer notes. But with the rediscounting methods here outlined, the turn-over on capital may be pushed to twenty or thirty times a year, or even more. One well-known company did a business of nearly \$33,000,000 in 1923 on a capital and surplus of \$1,600,000.

At this point it is interesting to note the percentage of delinquent payments on this type of installment note. In a well-managed company it will not be in excess of the delinquencies on mortgage interest payments. In actual practice the ratio is about the same. The collection of mortgage interest by trust companies and other agencies has been

of such long standing that age itself has lent a feeling of security as to the relative promptness of these interest payments. But ask the officer in charge of such collections at some institution with which you are familiar. Doesn't it speak well, therefore, for the methods practiced by the better finance companies, when we realize that their ratio of delinquent collections is not appreciably worse than mortgage interest payments? We must realize that age has given force to the idea of prompt, mortgage interest payments, which occur twice a year, while the installment notes, secured by the financed automobile, is a comparatively new thing and the payments must be made monthly.

CHARGES AND PROFITS

The average charge made by the finance company on a new car, in a transaction where the cash paid by the retail purchaser amounts to one-third of the selling price of the car, and the note is to run for one year, is from 9 per cent to 11 per cent of the amount financed. Second-hand cars take a higher rate. The note will call for the balance due the dealer, plus the finance charge and the cost of the insurance. The finance company also receives a broker's or agent's commission on the insurance. These company insurance accounts are considered sub-standard risks by the large insurance companies, on account of a number of features which may well be imagined. But from the standpoint of volume of business coming from a single source, and collection of premiums which is made monthly and promptly by the finance companies themselves, the account is a desirable one. Exclusive of this insurance item, the net profit of the finance company on the average car requiring \$500 is from \$5 to \$10, depending on the numerous conditions under

which it is operating. Some of the small companies operating in a local field with a small overhead, if they push their rediscounts, may reach the latter figure. There are so many factors entering into the final figure that its detailed treatment is impossible in this article. It must be understood, too, that these companies lay aside considerable surpluses to protect contingent losses and to increase their own credit facilities. When profits earned on these surpluses are credited with the profits earned on invested capital, the total bears, in the case of well-operated companies, a favorable ratio to the original capital.

As we have suggested that many of the companies are below standard, this low figure of \$5 is often shrunk to the other side of zero. The result is easily attainable if the dealers, the cars and the general credits are not watched closely. One authority suggests that there are about twenty makes of cars worthy of the finance company's operations, and the sooner the manufacturers and the dealers handling the balance are pushed beyond the margin by the lack of credit facilities, the better it will be for the automobile industry in particular and the public in general.

From the standpoint of profits alone the finance company must rather be contrasted than likened to a diamond mine. There are the average number of failures among these companies. Like most other business enterprises the reward is attractive to intelligent industry. Many attempts that lacked constant and far-sighted attention to details ended in disaster. This is true in both the large and the small companies. Several large losses may discourage the small company. The cost of stock promotion, large salaries to non-working entrepreneurs, heavy expenses of a centralized branch-office

system in distant cities, high rediscount and insurance rates, and a general inattention to the business by the holding "owners" of free, common stock in the larger companies, has furnished spicy liquidation reading for the financial page of our newspapers. These records in the hands of some bankers who do not understand the underlying plan, and hence cannot establish the proper relationship between cause and effect, have caused a mistrust of finance companies with a consequent high interest rate for rediscount accommodation. This mistrust is gradually decreasing as a large number of successful companies are establishing their credits by operations reflected through their balance sheets.

It would seem entirely fair to conclude that the finance charge and net profit on the average unit is inconsequential as compared with the total cost of the car and the direct service rendered the dealer and the buyer. When we consider these figures in relation to the general benefits to the industry and the public, as noted previously in the flow of credits, and the increased and steady production influences, we must conclude that the service is truly an economic one, since it leaves a goodly margin of benefits after the cost of its functions is subtracted.

WEAKNESSES OF THE FINANCE COMPANY

A mushroom company, organized on a water basis and operated with an oil-well vision, has a wonderful opportunity for spreading industrial disease. It will assist automobile manufacturers of its own ilk by advancing "Floor Plan" money to dealers who do not know the difference between gross and net profits. By maintaining these dealers for a time, it gives a portion of the public an opportunity to invest in cars that will

soon be known as "orphans"—automobiles no longer manufactured. Orphans have a low intrinsic value, a very small resale value, and are an economic loss even before conception. These conditions are naturally precedent to loose retail credits. This type of dealer falsifies the cash consideration or the trade allowance on the traded-in car. He will also give false declarations as to the year model of the car to be financed, as well as any other misinformation that may serve his purposes. His "service" to the buyer is of the same general style, and that service has a decided effect on the desire of the buyer to meet his installment payments with the finance company. The circle is completed, and its undesirability and consequent loss to all concerned becomes continuously greater, as long as the combination is allowed to survive. The only saving feature in this situation is that such companies never have an ancient lineage. They are necessarily self-destroyers, and their investors' money must be used to heal the many wounds. This particular kind of commercial microbe will be less prevalent as financing business becomes more firmly established.

ADVANTAGES OF THE FINANCE COMPANY

1. It is a service organization with special training and equipment for passing on the credits and collecting

the payments on installment automobile accounts.

2. By gathering business from various localities and makes of cars and types of dealers, it spreads the loss ratio so that it is not felt as a burden at any one point.

3. Scientific credits in this one field inject a stabilizing influence throughout the industry.

4. It hastens the weeding out process of manufacturers and dealers operating near the economic margin.

5. It relieves frozen credits for the manufacturer and the dealer.

6. It provides a safe medium for the transfer of regular commercial credits to the new automobile industry.

7. It serves as the linking credit medium as among the bank, the manufacturer, the dealer and the buyer.

8. By its providing a wider distribution it makes possible large scale production, with consequent savings in cost and selling price.

9. By providing for the distribution to dealers of the finished product during the dull season, it makes possible steady production, an important item in the cost of manufacture.

10. It makes possible retail purchase of automobiles from income rather than capital. This method has long been recognized as sound in other phases of the transportation problem, such as the railroads and water carriers.

The Automobile and the "Home" of the Future

By JOHN F. HARBESON, M.S.

School of Fine Arts, University of Pennsylvania

WE are still apt to think of home as an individual house—detached, as the realtors say, or at least semi-detached—with its own yard and garden, at any rate with a space for children to play in; having a dining room on the first floor as well as a living room, pantry and kitchen; and above stairs a spare room and a store room as well as the bedrooms of the family, these latter still ample in size.

MODERN LIVING DESTROYS THE HOME

However, if we make a survey of housing today, we find this picture represents but a small proportion of this element and that proportion is decreasing each year. Housing is tending to change in several ways, the extreme being the efficiency apartment, "all front and no back." This usually contains a living room, which becomes at other times dining room or bedroom by means of various ingenious folding devices, there being in addition to this room of all purposes only a small and compact bath and a likewise small and compact kitchenette, or possibly only a closet space in which are placed a gas stove, refrigerator and sink with ingenious racks and drawers for supplies and utensils. This type of home houses a small percentage of the population as yet, but is one which is growing yearly.

In between these two extremes are various types of housing, ranging up the line of compactness and so-called efficiency, but becoming more materialistic and less sentimental as they grow more compact and efficient.

This progressive change in housing has of course been caused by like changing conditions of the life of present-day

civilization. As a people we were originally simple in our tastes and demands, perhaps because we did not know of anything else. We are become luxury-loving, pleasure-seeking, less placid and more nervous. Luxuries and pleasures cost money. Large rooms and detached houses cost money—more of course than before—because the workmen who build them are paid higher wages than formerly, they, too, demanding their share of the luxuries and comforts, and therefore the money that makes these possible. As a people we are choosing the smaller rooms, the pleasures and excitements, and the expensive comforts. We are spending money on a number of things our grandfathers did not have: a bath to each bedroom—this is certainly the tendency; a heat of more than 70 degrees throughout the winter; running hot water, day or night, and in quantity; excitement at meals—music; and our pleasures have become expensive: theatre tickets now costing what would have been within the memory of man a week's wages of a laborer. Even our attempts at physical well-being cost money, it being essential that we wear the proper sports attire, and these always of the latest model.

In addition to the demands of modern life already mentioned is the automobile, which is sometimes a convenience, sometimes a means of recreation, but in either case has a considerable effect on present day living. It is an expense, as are the other luxuries of modern life, and somewhere in the budget of the motorist must be found an average of \$500 yearly for running charges, taking no account of deprecia-

tion. In reducing the proportion of one's earnings which can be spent for so many square feet of home, the automobile has therefore been an additional cause.

The automobile has also had another effect on modern housing. As cities have become crowded there has of course been a tendency to spread. Within the past this has been stopped by the limits which one could ordinarily walk to and from the nearest means of transportation. This has meant that suburbs have grown in a thin line along the railroads and in clusters around the ends of such electric railway lines as went beyond the city limits. The growth of the automobile industry and the enormous production, which has so lessened the first cost of these machines as to tempt a large proportion of the population to invest in them, have caused an ever-increasing number of suburbs to be built, of which the principal means of communication with the towns about which they cluster, and from which they largely derive their means of support, is the automobile.

Along with its use as a means of transportation is of course the ever-present pleasure of being skipper of one's own ship and spending one's time in the fresh air. It is natural, therefore, that we are gradually drifting to the general opinion that ample rooms are of small importance, as we spend so much time out of them. When we realize that this process is hastened by other economic factors such as the diminution in the supply of efficient house servants, which causes those that are available to be increasingly expensive, and which likewise causes the servantless multitudes to eat the majority of their meals in restaurants or other public hostleries, we see that the change in the composition of the home is one that has come to stay.

At present there is in almost all of

these suburban houses a garage, built either in the basement or at the back of the property. It is a question whether this is a tendency we can consider as permanent. With the still greater increase in the use of the automobile and the increasing modern tendency to do away with all replacement and buy a new machine rather than repair the old—therefore causing us to take much less trouble about keeping the old in good condition—it is quite probable that a neighborhood garage will take the place of these individual store spaces, it being more convenient in many ways and less expensive, considering the service rendered.

A HOME IN NAME ONLY

The other tendencies in house design are more apt to endure, largely because of the effect upon the budget of our modern comforts and the luxuries that we consider essential. The old-fashioned kitchen has already gone. The dining room is going; when a cubic foot of home costs so much, we naturally begrudge spending our money for a room which is really used so very little. Bedrooms will approach more and more the pullman car compartment or the stateroom on a steamer, comfortable enough for the few hours we spend in them. There will no longer be a spare-room; guests will go to a nearby inn; and of course a store room is an anachronism in this day, when we insist upon everything that we use being new. With the automobile at the curb, the home needs to be less a place to live in because it is so easy to get away from. There is more temptation to be always on the go and home becomes merely an overnight parking-place for the few hours after we finish our evening's entertainment and before the working part of the family must report at its place of earning its daily bread.

The tendency of modern families

toward childlessness has of course a great bearing upon this question. As a race we apparently do not assume the responsibility for replenishing the population. Perhaps it is only an acknowledgment of our lack of fitness for this responsibility. This tendency toward

a decreasing birth rate was quite marked before housing began to become compact and "efficient" in type. It therefore cannot be considered a cause, although the recognition of the tendency has certainly accelerated the change.

The Purity of Roadside Drinking Water What Pennsylvania Is Doing

By W. G. TURNBULL, M.D.

Deputy Secretary of Health, Commonwealth of Pennsylvania

WHEN the State Department of Health was organized in Pennsylvania in 1906, the annual death rate from typhoid fever in this state was 54.8 per 100,000 population. The great majority of cases were due to polluted water supply. Naturally, most of the epidemics occurred in communities having a public water supply, when the pollution of a single supply could infect a large number of people. Outbreaks caused by private water supplies were small and self-limited.

The supervision of public water supplies appeared, therefore, to be the most important step in the control of typhoid fever. Regulations were made governing the conditions under which water could be served to the public, and a Bureau of Sanitary Engineering was organized to assist the water companies and municipalities in complying with these regulations. Since that time the typhoid death rate has fallen steadily until in 1923 it reached 4.8 per 100,000. The public water supplies are under control and as a result are now but a small factor in transmitting disease.

Typhoid in Pennsylvania is now a rural problem rather than an urban

problem. This is true to a greater extent than statistics seem to show, as many cases developing in the cities have received their infection while on a trip to the country.

During this same period in which typhoid has been almost eliminated as a city disease, there has been a tremendous development of automobile travel and good roads. The traveling radius of millions of people in Pennsylvania has been increased from a few miles to several hundred miles. With this development has come a change in the importance of hundreds of water supplies. Roadside springs and wells, formerly used by single families, now furnish drinking water to lunch rooms, tourists' hotels, gasoline stations, or wayside drinking fountains. An infected spring or well, which formerly would cause disease in but a single family, may now infect large numbers of people in widely scattered communities.

ASSUMING CONTROL OF WATER SUPPLIES

Realizing this fact, the Pennsylvania Department of Health in 1924 felt that it should assume the control of these supplies along the main highways.

There are in Pennsylvania 10,300 miles of state highway, 3,942 miles of this being primary highway over which the bulk of traffic passes. It was decided that for the first year the work would be confined to the water supplies along the primary highways. The first problems to be solved were how all these supplies could be examined in a uniform manner.

The work had already been started in Ohio, which has a county health organization with local laboratories under state supervision. With Pennsylvania's centralized system of organization and large central laboratory, the Ohio method did not seem practical on account of the difficulty of properly collecting and shipping the large number of water samples. It was also feared that it would be difficult to develop a uniform technique for the work, if the sanitary inspection of the water supplies was made by different engineers in the various districts of the state. It was decided, therefore, to do all the work in the field, and to cover the primary highway system with one corps of trained workers. A two-ton truck with a large bus body was equipped with all apparatus necessary for the bacteriological examination of water. This laboratory was put in charge of a thoroughly trained bacteriologist with a field worker from the Section of Restaurant Hygiene as his assistant. The other member of the party was an experienced sanitary engineer who traveled in a separate automobile in advance of the laboratory, the traveling schedule being so arranged that the three men would meet each night.

The general policy adopted for the work was that only approved water supplies would be marked. This policy was adopted for three reasons:

1. It was realized that unapproved supplies would far outnumber ap-

proved supplies, and that the psychological effect of too many signs would be bad.

2. A large number of supplies that are potentially dangerous could not be proved dangerous at the time of examination. It would be unjust to mark these as dangerous, but there could be no injustice in withholding approval.

3. It was believed that better results could be obtained by making the signs popular and encouraging property owners to improve their water supplies in order to secure the sign, than could be obtained by posting an unpopular sign which would require constant police supervision to keep it in place.

This policy was followed except where supplies were found to be patently dangerous, and the posting of a warning sign the duty of the department.

METHODS EMPLOYED

In carrying out this policy the water supply was first examined by the sanitary engineer, who paid particular attention to the physical surroundings, drainage, character and protection of the well or spring. If changes or improvements could be readily made by the property holder, he was given the necessary instructions and opportunity. If the supply was finally approved by the sanitary engineer, he tacked in a prominent place a large red card bearing a serial number assigned to this supply. This was a sign to the laboratory which followed him that this supply was to be examined bacteriologically. Supplies disapproved on sanitary inspection were not examined further.

After the laboratory examination of these supplies was completed, those which were found to have met the bacteriological standards as well as the sanitary requirements were marked

with an enameled metal sign bearing the words "Safe Water Supply" and the date of approval.

The Department of Highways will in the near future place roadside signs along these highways requesting the traveling public to use only the approved water supplies.

During the summer of 1924 practically the entire primary highway system was covered by the traveling laboratory and 875 water supplies were examined. Of these only 38 per cent were found satisfactory and given safe water placards, many having this approval withheld until necessary changes were made. An additional 10 per cent disapproved on sanitary inspection can easily be made satis-

factory when suggested improvements are carried out, and will then be given a laboratory examination.

It is believed that re-examination of these supplies next summer will show a decided improvement. The work has met the approval of the traveling public, and the endorsement of the press. With increased information as to the meaning and intent of the safe water signs, the traveling public will make it unprofitable for any wayside eating house to maintain an unapproved supply.

It is an interesting experiment to the Department of Health, on account of its being a public health movement free from the always unpopular element of coercion.

Camping Sites in Public Parks and Forests

By L. F. KNEIPP

Executive Secretary, National Conference on Outdoor Recreation

THERE was a time when the average park or forest officer viewed the automobile merely as a mechanical curiosity; the automobile tourist as a misguided innocent who, burdened with gasoline-fumed troubles and responsibilities, lost much of the fine gifts of beauty and pleasure so freely available to the hardy souls who, with saddle and pack horse or with team, had access to the innermost recesses of the forests and mountains and enjoyed a certainty and comfort of locomotion which, to the automobilist, was a rare thing. But those days are long since passed away. Today, provision for the comfort and safety of the great host of motorists who now resort to the parks and forests for health and recreation is recognized by every park and forest officer as one of his primary obligations.

LURE OF THE OUT-OF-DOORS AND CONSEQUENCES

The growth in the motorists' use of the parks and forests was so gradual that for many years the officers in charge did not sense its true proportions. A road was regraded and improved here; a new section was constructed there; fords were replaced by bridges, and before anybody was really aware of it a great region, rich in scenic attraction and outdoor recreational opportunity, lay open to the motorist. Coincidentally, carload after carload of new motor cars were being unloaded in each of the nearby towns. A few venturesome souls found that they could drive out into the mountains and return home in safety and comfort; the open road called with an irresistible lure; and before their custodians fully

sensed the extent of the invasion the parks and forests teemed with pleasure-seeking, enthusiastic motorists.

The first tentative provisions for public campgrounds were purely defensive measures. For the growing army of automobilists created new conditions of hazard; hazard to public property through the thousands of campfires kindled daily by men who, however well-intentioned, knew little about the care of fire in the woods; hazard to public health due to the contamination of watersheds through the assemblage of thousands of people upon areas where no provision for the maintenance of good sanitary conditions had been made. The situation was in many respects an alarming one, requiring constructive action without delay. The first action which suggested itself was to draw the motorists to selected spots upon which the fire hazard and the menace to the health, not only of the motorists but of many thousands dependent upon the watersheds for water, could be held to the minimum. And so the first forest and park campgrounds came into existence. Even today there are many fine, well-equipped campgrounds maintained by state fire-protective organizations and other agencies solely for their protective value.

But as time wore on the vision of the park and forest officers passed beyond the bounds of self-interest and embraced the broader field of public service. Their studies of the situation disclosed to them the fact that the use of selected areas by motorists for camping purposes represented the highest form of human service to which such areas could be dedicated; that through such forms of use they returned more in human comfort and happiness than they possibly could in any other way. Since the ultimate objective of every good park administrator or forester is

to have the area under his management yield the maximum return in human service, each was quick to recognize and seize upon the new opportunity. Consequently, the park or forest campground has now ceased to be solely an instrument of fire or sanitary protection, but is instead a gesture of hospitality; an appreciation of an opportunity to serve.

A further extension of the park and forest campground system is now being stimulated by its possibilities as a source of revenue, materially reducing the costs payable from public funds. For there are an increasing number of motorists who prefer to seek the greater refinements and conveniences of the privately operated campground where for a moderate fee they may secure comforts and privileges not available on the free campgrounds. This trend creates increasing opportunity for private capital and managerial skill and a rental value for park and forest areas adapted to campground use. The fees paid materially offset the costs of park or forest administration and the motorists are enabled to secure the higher class of service for which they are willing to pay. Rarely, if ever, is the opportunity for gain allowed to deprive the public of free access to the areas really necessary for free camping purposes.

Years of experience have taught the automobile camper how to provide for his needs while afield, so that, as a rule, he fares forth well equipped and self-sufficient. His campground needs therefore are moderate: pure water, a convenient supply of firewood, simple sanitary facilities, a ready way of disposing of garbage or camp refuse, a fireplace in sites where the hazard is high; these, generally, are all that he asks or expects. In inclement regions or seasons any unpretentious form of shelter house which affords protection

against the elements is sure of appreciation. Tables and benches make a strong appeal and often influence a choice of campgrounds. Registration booths, where the apparently ever-present desire to inscribe one's name on something can be gratified, have a strong attraction. The basic necessities of a campground are not extensive nor expensive.

CONSTRUCTION COSTS

Exclusive of the shelter houses, tables and registration booths which, while desirable, are not imperatively necessary, the cost of installing the essential facilities on a campground capable of comfortably accommodating fifty people over night is in the neighborhood of two hundred dollars, assuming that water is convenient and that only pit toilets are to be installed. This is not a large sum, especially when distributed amongst the entire number of people using the campground during a single season. It is only when the total number of recognized campgrounds is considered that the true and rather alarming proportions of the total cost of an adequate system become evident. On the National Forests alone, the total number of areas used so extensively for camping as to warrant their dedication to such use is now about 1,500, which at \$200 each would require a total initial outlay of \$300,000 for their minimum development. To date Congress has appropriated \$50,000 for the purpose, and it has been only by the practice of numberless economies and the use of the slack time of fireguards and patrolmen that the Forest Service has been able to even partially keep pace with the growing needs of its summer visitors. More pretentiously developed campgrounds require heavy outlays of funds. A central comfort station with a battery of flush toilets requiring a con-

tinuous water supply and well-designed septic tank and distribution field will cost from \$5,000 up. Anybody who has built a garage can approximate the cost of a really well-designed shelter house. It is thus evident that many years must elapse before the average campground can offer to its visitors much more than the simple, even crude facilities mentioned in an earlier paragraph. Eventually, however, the motor camper will be able to spend every night of his trip on thoroughly comfortable, well-equipped campgrounds, provided he will do his part in demonstrating that they yield a return in better citizenship and greater individual efficiency commensurate with their cost.

NATIONAL PARKS AND FORESTS

Recent figures showing the extent of motor camping in state parks and forests have not been brought together, but it is certain that their increase during the past ten years has been as great, and perhaps greater than the increase in the National Parks and Forests. In these latter institutions automobile camping has about tripled in volume since 1916. In that year the number of visitors to the National Parks was 356,097; in 1923 it was 1,280,886. In 1916 the number of visitors to the National Forests was 2,370,000; in 1923, 10,553,000. In the National Parks the great bulk of travel has been by private automobile and the majority of the incoming tourists have brought their own camping equipment, prepared to camp out. In the National Forests in 1923 the proportion of automobilists to total visitors was about 88 per cent, and the proportion of campers, picnickers and transient tourists to the total was about the same. Every day these millions are looking ahead for clean, comfortable places in which to enjoy their noon-day

meal; every evening for similar places in which to make their over-night camps. Providing such places is to the park officer and the forest officer both a pleasure and a problem, but none fails to recognize it as a distinct obligation of public welfare and service.

In the National Parks the scenic beauty must be religiously preserved and good sanitation must be maintained; consequently it is necessary to rigidly restrict the automobile camper to designated campgrounds and impose careful conditions upon their use. In return, however, he enjoys sanitary systems planned in co-operation with the Public Health Service and installed at considerable expense: pure water, abundant firewood, tables and benches; electric lights, well policed grounds, and many other conveniences. Careful attention is given to the landscape aspect so as not to disturb natural conditions unnecessarily. The hotel, permanent camp, and transportation facilities in the National Parks have been greatly expanded to care for the mounting thousands who come each summer, but, nevertheless, the camper who "is on his own" is well provided for.

In some of the state parks, such as those of New York State, the campground facilities surpass anything to be found on the Federal lands, and many other states are rapidly attaining equally good standards. It is quite logical that State and National Park custodians should work aggressively to develop this increasingly important form of use.

NATIONAL AND STATE FORESTS

While neither the State nor National Forests in any but rare instances have as yet attained park standards in campground development, they nevertheless afford the motor camper an attractive field in which to follow his chosen bent. In the forests there are fewer really

first class campgrounds, but many more of the wilderness type, offering less in the way of electric lights, careful policing arrangements, and elaborate comfort stations, but making up the deficiencies by a great wealth of natural charm and scenic beauty, which after all is what the inveterate automobile camper most highly prizes. In the forests, rules may be a little less exacting; except in periods of extreme fire hazard one can camp in the isolation of the wilderness if he prefers that to the comfort of the campground. And each year marks the extension of the system to embrace new campgrounds or new facilities on old ones. Each year the forest officers, both Federal and State, are adding new gems to their campground collection, so that in the not far distant future the motorist planning his summer camping trip need only look on the map for the green blocks symbolical of a National or State Forest to find an area within which are combined all of the essentials of a happy hunting ground for automobile tourists. Within the forest limits, occupancy by the motor camper is, as a rule, informal and free from restriction. In many of them he must now secure a camp-fire permit, issued without charge or inconvenience; and in all of them he must exercise reasonable care with fire; he must observe the local game laws; and he must maintain a clean camp. One willing to observe these simple and most reasonable obligations has open to his free use and enjoyment the whole system of National and State Forests; areas rich in every element of natural beauty and interest essential to a thoroughly enjoyable camping trip.

At the call of President Coolidge, three hundred and nine leaders in social and humanitarian movements, representing one hundred and twenty-eight great national organizations, met in

Washington last May in the first National Conference on Outdoor Recreations. One of the outstanding recommendations of the Conference was that all public properties should be developed and made available to the public for purposes of outdoor recreation to the greatest degree consistent with the other purposes the areas were designed to serve. Toward this great objective the permanent organization created by the delegates to the Conference will

work in all practicable and reasonable ways. In view of the fact that travel to and through such properties will be preponderantly by automobile, and that their occupancy will be largely in the form of outdoor camping, the realization of the objective of the Conference will depend largely upon the expansion and continued betterment of the public campgrounds, and for such expansion and betterment the Conference proposes to work in all proper ways.

The Automobile and the Traveling Library

The Book Wagon Service

By KATHERINE TAPPERT

Librarian, The Morristown Library, Morristown, N. J.

WHEN I wrote "Books at Work in Washington County, Maryland," which was printed in the *American City* for January, 1920, I wrote to answer countless questions that came to the Washington County Free Library, Hagerstown, Maryland, asking for advice and information in organizing county library work and maintaining book cars or book vans that would make house to house visits, carrying the library directly to the front door of the country residents. In the four years that have gone by since that article was written, the county library movement, of which the book automobile is an important part, has grown tremendously and from the few outstanding book wagons existing in 1920 the number has increased many fold. From Massachusetts to California the sight of a book van on country roads is not unusual, and no longer are amusing questions asked of the driver of these vans. The first book cars were painted darker colors and did not have glass doors, so they

usually were taken for the "dead wagon" as the popular phrase went and often urged to pass on from the door where they had stopped.

THE PIONEER BOOK CAR

In 1920, the story of the book car was a simple one. It was easy to answer the questions that came to the Washington County Free Library concerning it, for that library had been the originator of the book wagon idea and had worked out a simple scheme for carrying on every detail of the work.

Miss Mary L. Titcomb, the librarian of the Washington County Free Library, had sent forth the first book wagon in April, 1905, and until 1910 it made its visits to the homes of the Washington County people. This first venture was a wagon drawn by two horses and the driver was the janitor of the library, a rare person who had ideal qualifications for the work. He knew the county, the people and the books and Miss Titcomb gave him much credit for the instant success of

this work. The wagon was fitted with shelves, carrying 250 books, and cost \$175.

In 1910 the wagon was struck by a railway train at a country crossing and for a few months the work was in abeyance. But this venture had been so picturesque and charming and so filled with good result, as an educational measure, that in 1912 the work was resumed with a specially constructed automobile truck carrying 300 books, taking the place of the old wagon. The annals of Miss Titcomb's library have been written and told many times and it is a tremendous satisfaction to all educators to know that, today, she is watching the growth of her idea from the same library, and that her work goes on with the same usefulness and distinction and with increasing influence.

Some time after the book wagon had been at work in Washington County, Maryland, two counties in Delaware—Sussex and Kent—took up the idea and the success of the work there was parallel to that in Maryland. Of course, county libraries had been established in several states before the book wagon idea was born, but they had served their patrons in a different manner. The old deposit stations and traveling library had been the scheme that satisfied in those years from 1891 until 1905, when the book wagon began to shed light in the Blue Ridge Mountains in Maryland. Between 1910 and 1924 book automobiles were added to county library systems in Ohio, Indiana, Illinois, Minnesota, Oregon, California and Alabama, and from the simple car, carrying 300 books and a driver and an assistant, there is in Hibbing, Minnesota, a book van which cost \$8,000, shelves 700 books, carries a librarian's desk and has room for twelve people inside its veritable library reading-room, lined with

shelves. The book lorry goes through the mining section about Hibbing and is one of the strongest influences in that state in the work of Americanization.

THE BOOK WAGON SERVICE

There are varying details in the administration of book wagons and various types of co-operation. In Morris County, New Jersey, the book wagon is the property of the Morris County Free Library and it makes daily trips through Morris County for that institution. One day in each month this book car is lent to the Morristown Library and with books belonging to this library and assistants from it, the car makes visits to eight stations in the township of Morris, the stations being four township schools—the Morristown School, a private school,—the Physiatic Institute, Mendham Town Hall and Western Avenue Fire House. The Morris County Library and the Morristown Library are quite separate institutions, but their co-operation in book distribution through a book wagon is one interesting example of the possibilities for wide service that this method offers. Motor book lorries are used in England by the County Library Associations, but they are not so usual as they have grown to be in the United States. However, a Perthshire book van starting on its county tour has much the same appearance as one going forth from Kern County, California, or Boone County, Kentucky.

The variation in book wagon service has had another turn in Evanston, Illinois, where the Public Library has used a book wagon to visit schools and playgrounds and branches within the city limits.

A half-sister of the book wagon sent out by the county and public libraries is the book shop on wheels. Christo-

pher Morley's *Parnassus on Wheels* came to life a few summers ago, when an automobile went forth from the Educational and Industrial Union of Boston, furnished with books by the Book Shop for Boys and Girls. This caravan had so successful a summer selling books along the North Shore that Frank Shay followed another New England route the next year, with a book caravan that brought the latest printed word to grown-ups. Even if these are commercial ventures they show the way the wind is blowing and give an indication of the necessity of books in the life of any nation.

After all, there is small difference whether the book van is the simple wagon of 1905, carrying 250 well-selected books to the home-bound mountaineers, or an \$8,000 book lorry of luxurious appointment carrying several hundred books to the miners of Minnesota, or an ample car penetrating the fastnesses of Alabama's rural districts. The one salient feature that has led to making the movement a real part of history is the wise policy of book selection that has been observed by the women and men who have carried the idea from Maryland to Oregon. The best books that would be read by the potential readers have been carried to them and besides carrying just books, the automobile book wagon has carried women, usually, who knew the psychology of the borrowers along the road, and these women have entered into the daily life of the communities which they have visited. "Land that is to become fertile must first be tilled,"

and the success of the book wagon in every part of the United States is due to the "tillage of the land." When Walter Page was editor of *World's Work*, he—a Southerner—said to Miss Titcomb—a Northerner most successfully transplanted in the South—that she must not expect to accomplish anything in a Southern community until she knew when the baby had cut his first tooth—or his last one. That is the secret of success in any community, and all leaders and teachers know that it applies to the north, east, or west, as well as to the south.

The growth in the use of the automobile has rushed life along and brought many changes in the twenty years that have passed since the book wagon, drawn by two smart black horses, stopped at the first gate on a Maryland turnpike and offered a winters' reading for the choosing. The automobile has carried the book to thousands of country people since then and it has as certainly brought the farmer to the town and to the book that is housed in the central library, whether that library be a county library, a city library or an endowed library. Maybe the work has reached its peak and maybe the automobile book van will pass into history, while the airplane will come on to pick up a best seller at the publishing house on Long Island to drop into the reader's hand in Wyoming. However marvelous developments may be, it will be difficult to equal in charming simplicity and incalculable good the work done by the first book wagon of 1905.

Consolidation of Schools and Pupil Transportation

The Use of the Automobile in Education

By LEROY A. KING, PH.D.

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THERE has probably been no movement in education that promises so far-reaching an influence for the development of rural life in our country as that of the consolidated school and pupil transportation. Undoubtedly, we are just at the beginning of its development in most of the states of the union. The consolidated school has already justified itself educationally. To get a proper perspective of the present situation, however, it may be well to look briefly into the historical background of the beginning of this movement.

HISTORY OF THE CONSOLIDATION MOVEMENT

Horace Mann, from the very beginning of his term as secretary of the Board of Education of Massachusetts, recognized in the school district system one of the greatest barriers to educational progress. In 1838, he succeeded in having a law passed by the legislature authorizing two or more districts to establish a union school, and in 1850 a law was placed on the statute books instructing a town of ways and means to dispose of its district schoolhouses in case it decided to abolish the district. It is reported that by 1860 probably one hundred towns and cities including about one-half the inhabitants of the state had voluntarily abandoned the district system. During the next two decades, several laws were passed abolishing school districts but were just as speedily restored by succeeding legislatures, until finally in 1882 the school

district was permanently abolished. At that time only forty towns had retained the district.¹

A far-reaching social and economic transformation took place in Massachusetts when manufacturing displaced agriculture. As industrial communities and cities sprang up over the state, a general movement of the people from the rural districts to the larger centers resulted. This left stranded many of the once-flourishing district schools, and the effect was a widespread movement for consolidation.

While the first law authorizing the consolidation of schools was passed by the Massachusetts Legislature in 1867, consolidation received its first impetus through the passage of the law of 1869 authorizing school trustees to pay, out of its school funds, for the retransportation of children to a neighboring district. The law reads as follows:

Any town in the Commonwealth may raise by taxation or otherwise and appropriate money to be expended by the school committee in their discretion in providing for the conveyance of pupils to and from public schools.

The records show that the towns of Greenfield and Quincy closed their district schools in 1869 and 1874 respectively, and had the pupils conveyed to central schools. The town of Montague was a real pioneer in closing a large number of district schools in 1875,

¹ Consolidation of Schools and Transportation of Pupils at Public Expense, Bulletin of the Department of Education of Massachusetts, 1920, No. 6.

conveying both the elementary and high school pupils to a central school. The town of Concord was probably the first to effect complete consolidation, since the records show that all the district schools were closed in 1887 and the pupils were transported to a new eight-room school building.²

Mr. Seymour Rockwell, a member of the school committee of the town of Montague, wrote in 1893 regarding the consolidation of schools as follows:

For 18 years we have had the best attendance for the transported children; no more sickness among them and no accidents. The children like the plan exceedingly. We have saved the town at least \$600 a year. All these children now attend a well-equipped schoolhouse at the center. The schools are graded; everybody is converted to the plan. We encountered all the opposition found anywhere, but we asserted our sensible and legal rights and accomplished the work. I see no way of bringing the country schools up but to consolidate them, making them worth seeing; then the people will be more likely to do their duty by visiting them.

The movement spread from Massachusetts into Ohio and Indiana. Like Massachusetts, they organized on the township basis of administration, which plan tends to make the consolidation or centralization of schools more feasible. In 1892, Kingsville Township, Ohio, decided to transport the children of the township to a central district school, and through the enactment of a bill in the General Assembly the state met the cost of transportation. After the passage of several subsequent laws applicable to individual districts, the General Assembly in 1898 passed a general law relative to transportation. This was followed by another act in 1904 authorizing the boards of education in

townships to abolish all sub-districts and convey the pupils to a central district. The movement for consolidation progressed rapidly until, in 1912, one hundred and ninety-two townships in the state had completely centralized their schools.³

In Indiana the consolidation movement began to flourish with the passage of an act by the Legislature in 1889 recognizing the right of township trustees to pay for the transportation of pupils to consolidated schools. In 1912, there were five hundred and eighty-nine consolidated schools distributed in seventy-three of the ninety-two counties of the state.

While Massachusetts, Ohio and Indiana have probably established a greater proportion of consolidated schools than any of the other states, yet today there is not a state in which there are not consolidated schools. States with the larger township and county units of administration have made the greatest progress. New York and Illinois with the school district type of organization have proportionally the smallest number of consolidated schools.

GRANTING OF STATE SUPPORT

In practically all the states, there is now written on the statute books permissive legislation giving the voters of the school district the authority to centralize their schools and transport the pupils at public expense. In some of the states, these laws have become mandatory, requiring school districts to establish schools that give children adequate educational opportunities. However, in a number of states, the consolidation and transportation movement has received its greatest impetus

² Consolidation of Schools and Transportation of Pupils at Public Expense, Bulletin of the Department of Education of Massachusetts, 1920, No. 6.

³ Consolidation of Rural School and Transportation of Public at Public Expense, by A. C. Monahan, United States Bureau of Education, Bulletin, 1914, No. 30.

through legislation requiring the state to aid the local district by meeting part or all the expense of some phase of consolidation, such as transportation, supervision, cost of building, etc.

The following state laws are significant:

Delaware. The schools are administered by the state which pays entire cost of transportation. Appropriations of \$100,000 for 1923-24 and \$105,000 for 1924-25 were made to cover the costs of pupil transportation including purchase of new vehicles, drivers' salaries, maintenance, etc.

Iowa. The state gives aid to approved consolidated schools for maintenance annually as follows:

Two-room schools	\$200
Three-room schools	500
Four-or more-room schools ..	750

This aid may be expended for any current expenses including transportation.

Massachusetts. A town of less than five hundred families that does not maintain a high school must provide for the instruction of its high school pupils in the schools of another town, pay their tuition and the cost of transportation up to 40 cents per pupil per day of actual attendance.

If the amount spent for schools in the three preceding years averaged more than \$4.50 and less than \$5 of each \$1,000 raised by local tax, the state will reimburse the town for one-half the amount paid for such secondary pupil transportation. If the average was more than \$5 and less than \$6, the reimbursement is three-fourths of the amount; if more than \$6, then for the entire amount, such reimbursement not to be based on any cost of more than 40 cents per pupil per day of actual attendance, except when pupils travel more than three miles in some manner other than by pupil convey-

ance. In that case the town may be reimbursed three-fourths of the amount spent above 40 cents, but not above 80 cents for each day of attendance.

Pennsylvania. Any school closed because of an average term attendance of 10 or less than 10 shall furnish transportation for its pupils to some other school or schools if the children reside one and one-half or more miles from such schools, and the state will pay one-half of the cost of such transportation, the state's share not to exceed \$1 per day per pupil.

Consolidated schools, joint consolidated schools, and schools that have transported pupils to another for the purpose of better gradation—when approved by the state council of education—shall receive annually from the state one-half the sum spent for transportation during the previous year, not including costs of repair and purchase of vehicles. No district shall receive more than \$3,000 from the state for this purpose in any one year. The state also appropriates two hundred dollars for each one-teacher school closed to effect the consolidated district.

Vermont. The state pays the cost of transportation or board of all children residing more than one and one-half miles from the school, in towns with a grand list of less than \$5,000, and its share in the ratio that \$5,000 bears to the grand list if that is more than \$5,000. But the state shall not pay any town district an average of over \$20 a year for each pupil transported.

Wisconsin. The school board of a district, acting on a vote of the district, may suspend the school, pay the tuition of the children in another district or districts, and provide transportation thither for all children living more than one mile from the nearest school. If the school has been closed eight or more months, taxes levied, and contracts for

TABLE I.—DATA ON CONSOLIDATION AND TRANSPORTATION FOR 1922-24, OBTAINED THROUGH A QUESTIONNAIRE AND REPORTS FROM STATE DEPARTMENTS OF EDUCATION IN SIXTEEN TYPICAL STATES

	ARK.	DEL.	ILL.	IOWA	KY.	MASS.	MICH.	MINN.	MISS.	MO.	NBR.	N. C.	ORE.	PA.	TEX.	VT.	TOTAL	AVE.
No. consolidated schools.....	220	26	124	357	180	2,200 ^b	47 ^c	321	470	248	96	491	53	400	526	10	5,946	371.6
No. pupils attending consolidated schools.....	35,000	3,500	40,274 ^d	81,131	17,500	607,000 ^b	10,750	....	61,821	42,432 ^e	14,728	....	3,000	50,000	....	2,000	969,136	74,548.9
No. pupils transported.....	1,200	2,500	600	45,900	8,000	27,000	5,779	27,768	30,772	1,200	4,5301	31,544	1,500	15,000	9,054	....	212,947	14,196.4
No. motor buses used.....	70	60	30	1,023	200	250	207	....	1,530 ^f	20	156	888	100	600	153	....	5,266	376.1
No. horse-drawn vehicles used.....	None	3	None	1,709	100	850	21	....	....	27	86	....	....	500	260	....	3,556	323.3
Capital outlay.....	\$50,000	....	....	....	....	\$30,000 ^g	\$240,000	....	....	....	\$110,038	\$250,000	....	\$300,000	....	....	\$980,038	\$163,343
Cost of transportation.....	....	....	....	....	....	....	....	\$897,273	\$795,576	\$78,820	\$157,506	....	....	\$600,000	....	....	\$2,529,175	\$505,535
Cost per pupil per month.....	....	....	....	\$5.24	\$3.00	\$4.40	....	\$3.18	\$3.18	....	\$6.00	....	\$7.00	\$3.00	\$2.64	\$5.68	\$43.72	\$4.37
No. one-teacher schools.....	3,800	267	10,044	11,000	5,900	692	6,658	....	....	650	6,317	3,240	2,000	8,889	....	1,160	60,617	4,663
No. pupils attending one-teacher schools.....	225,000	7,602	200,000	205,000	....	14,912	200,000	....	....	6,500	129,581	50,000	....	250,000	....	15,500	1,304,005	118,554.1
No. one-teacher schools closed in five-year period.....	100	43	100	1,000	760	100	244	....	....	185	80	1,441	....	400	100	None	4,543	426.4
State support for consolidation and transportation.....	....	Context	None	Context	None	Context	\$1,000 maintenance per vehicle.	Context	....	Approximately \$25 per square mile per year. Total not to exceed \$2,000.	None	tributed to counties for aid in transportation.	None	Context	In construction of buildings.	Context	....	....

¹ Includes all schools of two or more rooms in Massachusetts.² Consolidated under Rural Agriculture School Act, operative in 1919. There are approximately two hundred consolidation districts from the standpoint of administration, with some transportation.³ Including two city consolidated districts.⁴ Including 9,384 high school pupils.⁵ Including horse-drawn vehicles.⁶ Buses, in general, privately owned.

transportation and tuition legally carried out, the district is given \$150 as special state aid. A union free high school may also receive \$150 of state aid annually on account of pupil transportation.

EXAMPLES OF GROWTH OF CONSOLIDATION AND TRANSPORTATION MOVEMENT

In Table I will be found data relative to the consolidation and transportation movement as given by the respective state departments of education of a group of sixteen states representing every section of the country. These sixteen states represent a total of 5,946 consolidated schools with a total attendance of approximately 969,136 pupils. Of this number, 212,947 are transported by 5,266 busses and by 3,556 horse-drawn vehicles. It is significant to note that in thirteen of the sixteen states, 4,543 one-teacher schools were closed during the past five years. While the abandoning of one-teacher schools was brought about in approximately equal proportion in all sections of the United States, yet in the states of Iowa, Kentucky and Pennsylvania the movement was carried on to a greater extent than in any of the other states. Thirteen of the sixteen states report that there are 60,617 one-teacher schools in use in their states, which is an average of approximately 4,663 per state. Iowa, Illinois and Pennsylvania lead with approximately 11,000, 10,000 and 9,000, respectively. The capital outlay for motor busses in six of the states is estimated at \$980,058, and the cost of transportation in five of the states which had this information available is \$2,529,175.

This data is substantiated by statistics issued by the United States Bureau of Education,⁴ who estimate that there are today approximately 12,500 consolidated schools in the

United States with an enrollment of approximately 2,050,000. They also estimate that there are 37,000 vehicles used in public school transportation for 851,000 children daily at public expense to and from schools. A conservative estimate of the capital outlay is in the neighborhood of \$7,500,000. In *Facts and Figures of the Automobile Industry, 1924*, issued by the National Automobile Chamber of Commerce, it is reported that in 1923 there were 13,037 consolidated rural schools in the United States, of which 1,393 were established in 1913 alone. They report that 504,933 children are transported to schools at public expense and that of this enormous number approximately 289,000 children ride in motor busses.

While these figures are somewhat at variance, yet they point out unmistakably the tremendous growth of this movement in the United States in recent years. With all of this development, however, it must not be overlooked that the Federal Bureau of Education also reports that there are approximately 175,000 one-room schools in the United States with an enrollment of approximately 3,289,000. The Bureau estimates that there were probably 20,000 one-teacher schools in the United States closed during the past three years.

The growth of the consolidation movement can also be well illustrated by the data shown on page 74 from a typical southern and western state.

THE USE OF THE AUTOMOBILE IN TRANSPORTATION OF PUPILS

To supplement the data just covered relative to state development, it

⁴ *Consolidation of Schools and Transportation of Pupils*, by J. F. Abel, United States Bureau of Education, Bulletin, 1923, No. 41. Also Unpublished Manuscript by the Rural School Department, Bureau of Education, Washington, D. C.

TABLE II

	1917	1920	INCREASE IN PER CENT
<i>In Mississippi:*</i>			
Number of counties having consolidated schools	64	78	22
Number of consolidated schools	290	470	62
Number of teachers in consolidated schools	977	2,049	109
Number of wagons or auto trucks used	725	1,539	112
Enrollment	30,037	61,821	87
Number of pupils transported	14,643	30,772	110
Cost of transportation per month		\$89,447	...
Cost per pupil per month		\$3.18	...
Number of teachers' homes in consolidated schools		98	...

In Iowa:†

1897-1912, average of 1 new consolidated school per year.

1913-1916, average of 40 new consolidated schools per year.

1917-1920, average of 60 new consolidated schools per year.

Total to date (December, 1921) is 439.

* *Consolidated Schools*, by J. T. Calhoun, State of Mississippi, Department of Education, Bulletin No. 17, 1920.

† *Growth of Consolidated Schools in Iowa*, by Macy Campbell. Bulletin of the Iowa State Teachers' College, Department of Rural Education, September, 1921.

might be well to point out the progress made in consolidation and pupil transportation through the use of the automobile in Montgomery County, Pennsylvania; Montgomery County, Alabama; and Randolph County, Indiana.

Montgomery County, Pennsylvania

In the period prior to 1923 there were 60 one-teacher schools in the rural districts closed through the organization of 18 consolidated centers. Some of the early rural centers transported their children by railroad or trolley. West Norriton, the first district to consolidate its schools, used the auto bus as early as 1909, when consolidation went into effect. Today, practically all the districts use auto busses and in the majority of the cases the busses are owned by the district.

According to County Superintendent A. M. Kulp, there are in every district in the county sufficient hard roads to adopt a policy of consolidation effec-

tively and economically. The total mileage of good roads has increased because of consolidation. Today, there is hardly a district in Montgomery County in which the future consolidation policy of the directors of the public schools does not enter into that phase of the road progress which determines the order in which roads shall be improved.

Undoubtedly the auto bus, which makes transportation possible in these rural centers, has been the dominant factor in rural progress. It has made possible community centers in the open country whose standards of progress and whose ideals of civic improvement have gradually approached those existing in urban centers.

District "X" (see map) maintains nine one-room schools. There is a total enrollment of approximately 300 pupils. These pupils are at a distinct disadvantage when their school opportunities are compared with those of

DIAGRAM 1.—ILLUSTRATING THE CONSOLIDATED SCHOOL CENTERS, (SHADED PORTIONS) AND THE DISTRICTS WITH ONE-TEACHER SCHOOLS, OF MONTGOMERY COUNTY, PENNSYLVANIA

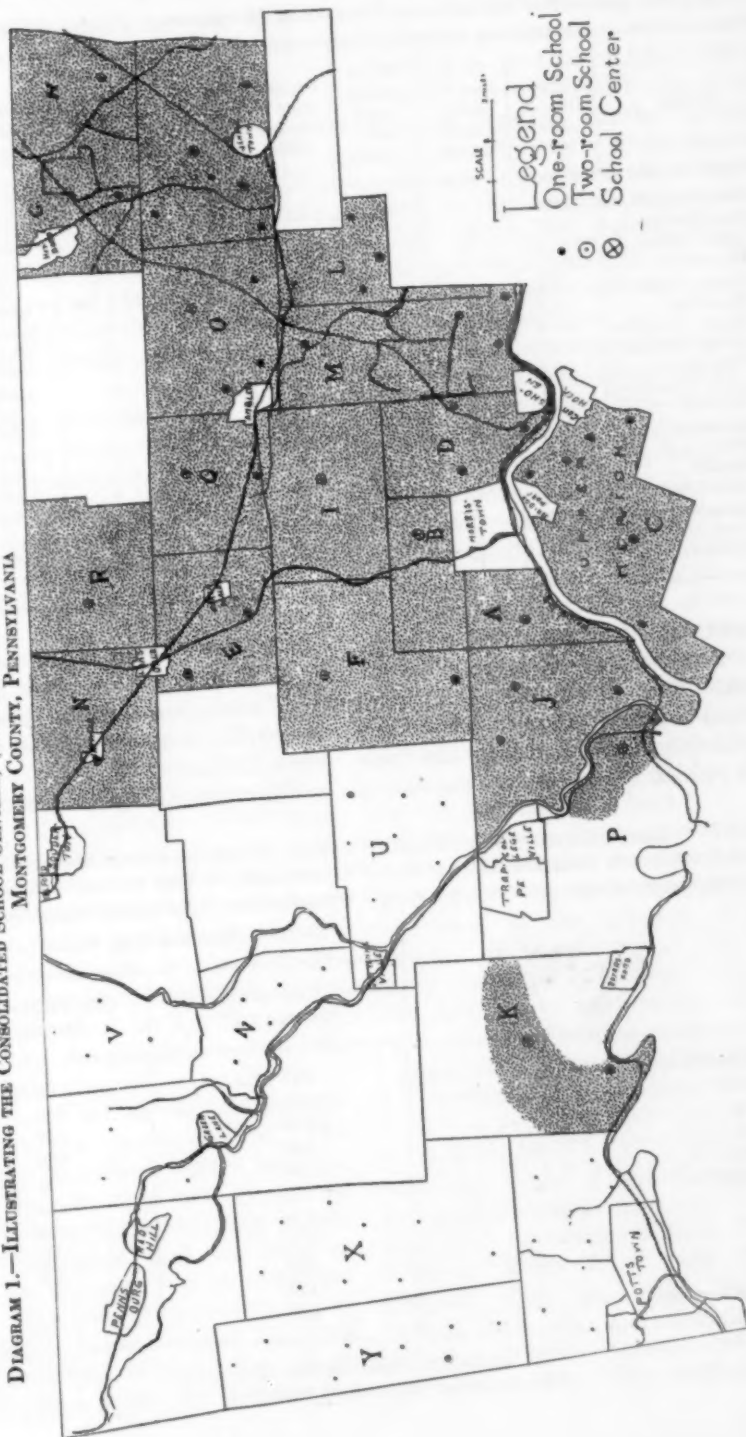


TABLE III.—THE CONSOLIDATED CENTERS OF MONTGOMERY COUNTY, PENNSYLVANIA

District	Year Consolidated	No. of Consolidated rural centers	No. of schools closed since 1909	No. and types of transportation	No. of children transported	District-owned bus* Privately owned bus†	Total cost of transportation	Cost per child per day
A. West Norriton ...	1909	1	1	1 auto	125	*	\$1,424.99	\$.057
B. East Norriton ...	1912	1	1	1 auto	29	*	654.88	.112
C. Upper Merion ...	1911-1917	5	7	4 autos	117	*	3,300.00	.141
D. Plymouth.....	1914	2	4	Trolley	29		726.00	1.25
E. Upper Gwynedd	1915	2	4	2 autos	97	†	1,980.00	.113
F. Worcester.....	1915	2	7	1 auto	225	*	2,553.85	.066
G. Upper Moreland	1916	1	1	1 auto	54	†	1,800.00	.106
H. Lower Moreland.	1917	1	3	2 autos	46	†	1,877.00	.203
I. Whitpain.....	1917	1	6	2 autos	200	*	2,179.47	.06
J. Lower Providence	1917	3	4	Trolley	65		2,387.04	.204
K. Limerick.....	1917	1	5	Trolley	84		1,437.98	.107
L. Springfield.....	1920	3	1	2 autos	60	*	.....	.....
M. Whitmarsh	1921	3	4	2 autos	175	†	4,495.98	.128
N. Hatfield.....	1921	1	7	3 autos	222	†	7,200.00	.18
O. Upper Dublin ...	1922	3	1	1 auto	40	*	1,318.61	.164
P. Upper Providence	1922	1	2	1 auto	7	†	450.00	.357
Q. Lower Gwynedd.	1924	2	3	1 auto	92	†	1,800.00	.101
R. Montgomery....	1924	1	3	1 auto	12	†	600.00	.277

District "J" (see map), which maintains a one-teacher-to-a-grade organization. This disadvantage in time devoted to school subjects per week in the eighth grade is shown by the table below, which represents the median of

the times devoted to the various subjects in the nine schools of District "X" compared with the times devoted to pupils in a one-teacher-to-a-grade organization.

Other advantages, according to the

TABLE IV.—TIME ALLOTMENT IN THE EIGHTH GRADE IN A CONSOLIDATED SCHOOL IN ONE DISTRICT IN COMPARISON WITH THE MEDIAN ONE-TEACHER SCHOOL TIME IN ANOTHER DISTRICT

SUBJECT	MINUTES PER WEEK	
	Consolidated Schools District "J"	One-Teacher Schools District "X"
History and Civics.....	715 Min.	180 Min.
Arithmetic.....	1,200	350
Reading.....	1,650	550
Spelling.....	800	330
Language.....	1,000	"X"
Geography.....	750	135
Music.....	370	30
Drawing.....	210	30
Writing.....	355	75
Sewing.....	130	*
Systematic memory work.....	120	*

"X" Included in time devoted to spelling.

* Not included in course of study.

county superintendent, for the child attending the consolidated schools are:

- (1) Grouping of children so that an enriched curriculum may be used with bright pupils, and manual skills developed in the training of children who make slow academic progress.
- (2) Social contacts in large groups of children of their own mental and physical development.
- (3) Mass athletics and organized play.
- (4) Contact with the practical arts; home-making for girls and agriculture for boys.
- (5) Art appreciation through the employment of supervisors of music, drawing and penmanship.

The Barren Hill rural center was formed in 1921. Its community is approximately five square miles. In this district a strong home and school league function to promote sentiment for better schools and to elevate the civic ideals of the district. They have been instrumental in having hot lunches served to the school children. They have made visual education possible through the purchase of stereopticon views for use in the schools. Their co-operation contributed to the success of an excellent Lyceum course promoted by the principal and the directors of the district.

Since consolidation was effected, the community has grown rapidly. The excellently organized school and the community life that has grown up around it have attracted many people from Philadelphia and its suburbs. Here, also, the auto bus in education has substituted a city-to-country movement for the former exodus from the country-to-city. Within the short space of three years the demand for

new homes has increased real estate values enormously.

Hatfield Joint Consolidated School maintains a first-class high school with vocational courses. Musical instruction is given to every student enrolled. So enthusiastic has been the reception to work in music and art appreciation that the auditorium, seating approximately five hundred, has been filled whenever the children of the community render a program.

The agricultural supervisor has become a scientific missionary among the farmers who heretofore were practising their vocation in the traditional way. Seed corn, milk and soil have been tested for farmers living in all parts of the district which is the prototype of the New England town. Courses in cooking, dressmaking, laundering, costume designing, etc., have given the life of the community a new aspect. High school girls and boys have carried their new ideals into their homes as well as into the houses of other communities where they have appeared at public meetings, publicly describing their achievement in school.

These are only types of community centers prevailing all over the country. But in every one there exists the same confidence in the efficacy of their schools. In no community could one find a considerable number of citizens who desire to go back to the old one-room school. Original doubters have become the staunchest advocates of this method for educational development. A period of only two or three years is required to pass through the successive stages of violent opposition and quiescent skepticism, and then enthusiastic advocacy of these schools follows. Everywhere, the feeling prevails that the auto bus and better roads are the agencies that make possible the consolidated school with its resultant fuller rural life, and

only through it can rural sections be saved from farm depletion.

Montgomery County, Alabama

Montgomery County, Alabama,⁵ is an outstanding example in the South of the development of the consolidation movement. As a result of a county survey in 1917, the board of education decided to consolidate the schools of the county and in 1918 and 1919 twelve auto busses were purchased to transport children to the seven rural centers. By May, 1922, the board had purchased a total of twenty machines. These, according to the superintendent of schools, covered a mileage of 107,308 miles for the school year ending in May, 1922.

Randolph County, Indiana

Randolph County, Indiana, is one of the most conspicuous examples of consolidation in the Middle West. The county has excellent roads and the consolidation problem as a consequence was very much simplified. According to an account issued in 1921 by the county superintendent of schools, the children are transported to school and returned home without great cost and with general approval of the patrons. The outstanding feature of this county is probably its high school courses.⁶ Prior to consolidation comparatively few eighth-grade graduates entered high school. A thorough investigation showed that for five years previous to consolidation the percentage entering high school after completing the eighth grade varied from 21 to 50, with an average for the county of less than 40 per cent. Since consolidation the entire county has averaged more than 93

per cent. In the years 1915-1917, out of a possible 735 pupils, 706, or slightly more than 96 per cent, entered high school.

CONSOLIDATION THROUGH THE MOTOR BUS

In practically every state authority has been given to school officials by the state legislature to utilize public funds for transportation of school children. It is difficult to say just how large a consolidation unit should be, since there are many factors that must be taken into consideration such as population, topographical conditions, wealth of the district, condition of roads and the kind of transportation desired by the people. Undoubtedly, auto transportation is the most desirable, provided conditions make it feasible, since it tends to insure a larger consolidated unit. A small consolidated unit, while it is an improvement over the one-teacher school, has been found universally unsatisfactory. The transportation problem has become mutually tied up with the good roads movement in the several states. Wherever the co-operation of the government officials is obtained in planning road improvements, the difficulties of transportation decrease. The state departments of education reported in the questionnaires that motor busses are now being generally installed in new consolidation centers and are replacing horse-drawn vehicles just as rapidly as the good roads development is keeping in line with educational progress.

Auto companies are manufacturing and developing many kinds of motor-driven busses and school people may select from a wide choice of machines adapted to a variety of needs.

Through the modern improvements in auto bus construction, school children ride in comfort and, according to superintendents, in them they are less

⁵ *Transportation of School Children*, Montgomery County, Alabama, T. R. Head, Jr., September, 1922.

⁶ *School Consolidation and Rural Life*. Bureau of Education, Rural School Leaflet No. 1, February, 1922.

exposed to cold and inclement weather. Notwithstanding the greater initial cost, the auto bus can be run quite economically because of the saving of time which enables the same machine to make several trips. One auto frequently does the work of three horse-drawn vehicles.

The automobile has been found invaluable to superintendents and supervising principals and to school officials in the administration of schools. In the rural districts, the agriculture specialists and farm agents are able, by the use of it, to make first-hand contacts with the farmers of the county. It is the means by which the vocational supervisors in agriculture and home economics supervise schools and carry on their itinerant teaching in the small and scattered one-room schools. Moreover, its use is most important in furthering the project work required of students in rural vocational schools, which work must be closely supervised through the summer months.

Superintendent Clyde T. Saylor, of Chester County, Pa., reports that dental hygiene work has been made possible in his county through the use of the automobile. He says:

A thoroughly trained dental hygienist spends her time (ten months of the year) in the schools giving lessons on the care of the teeth. She holds dental clinics for the examination of the teeth of the school children and even cleans the teeth of those who need it. She carries all her own equipment, including a folding dental chair, with her in her car. She visits principally one-teacher schools and spends an entire day in each school. The dental hygienist has been able to give prophylactic treatment to from eight to twelve children in a day, which means that from fifteen hundred to two thousand children receive dental treatment annually in the rural districts.

It is a well-known fact that the automobile and the motor bus are being put

into service more and more in the larger cities of our country, for the transportation of children to schools concentrated in larger centers, and to schools with special class instruction. Schools for crippled children, open-air schools, schools for mental defectives, continuation schools, etc., are examples of some types of specialized education.

The superintendent of the New York schools reports that the city employs 180 motor busses in which 7,512 children are carried daily. These include kindergarten pupils and crippled elementary and high school pupils. Between the hours of ten and twelve, the machines owned by the city are utilized in delivering supplies and equipment throughout the city, thereby making the investment an economical proposition.

Detroit has invested approximately \$32,000 in 15 motor busses to convey crippled, blind and deaf children and those afflicted with weak hearts.

Baltimore and Philadelphia report extensive and constantly increasing use of the automobile. The latter city employs 12 busses to transport 300 crippled children and four busses to convey children from rural parts of the city.

ADVANTAGES OF SCHOOL CONSOLIDATION

Since the limited data available on this topic very definitely indicates that the auto bus and the automobile contribute so materially in the development of education in the rural country, it might be well, in closing, to point out in a general way the far-reaching effect that the consolidated school is making on the educational development of this country.

From a social and economic standpoint:

1. It stimulates a rapid and stable community development in all social and eco-

nomie life through public interest aroused in schools.

2. It tends to broaden the social community life and community spirit. This can be exemplified by the development of the community church, the grange, the lyceum, public evening meetings and entertainments of all types.

3. It increases land values, as prospective buyers are willing to pay for better educational advantages. In Champaign County, Ohio, for example, 55 per cent of the children in the community who go to the consolidated schools come from homes owned by their parents. In one of the townships the percentage of parents owning their own homes has increased in three years from 30 to 64 per cent. Highways have been improved in all parts of the county and the superintendent reports that 1,025 miles of good roads in the county have resulted largely from consolidation. Rural communities, that at one time seemed remote, can now be reached by automobile in an hour's time and by telephone in a few minutes.

From the standpoint of organization, administration and supervision:

(1) Consolidation recognizes the principle of equality of educational opportunity. This means a longer school term, more skillful teaching, specialized instruction, helpful supervision, graded school conditions, well-organized and enriched curricula, adequate provision in grounds, building and equipment, high school advantages—equal opportunities for every boy and girl, whether rural-bred or city-bred.

(2) Consolidation tends to equalize the educational burden in that local school support is obtained from a larger area, thereby causing the wealthier districts through equalized taxation to help support those less fortunately situated.

(3) It affords the possibility of arranging better units for the apportionment of school-funds. State school support should be distributed on the basis of ability and needs with the thought at the same time of stimulating effort and the proper use of funds.

Influence of the Automobile on the City Church

By JAMES J. COALE

Secretary, Presbytery of Baltimore, Committee on National Missions

THE metropolitan centers in the United States have grown up around the development of industry. Their growth and the shaping of their area have been determined by the establishment of facilities for transportation. The electric trolley car, in the closing years of the nineteenth and the first two decades of the twentieth centuries, not only made possible the sheer physical feat of housing vast populations in the cities, but determined exactly what areas in the metropolitan districts might be built up, and was one factor in deciding the economic and cultural levels of the various sections of the city.

THE PROBLEM

No other group in the city's population has been more affected by this familiar development than the churches. Following the rush of population up-town in New York City, made possible by the building of the elevated railroad system, and the electrification of the horse-car lines, it is stated that over two hundred churches south of Fourteenth Street moved north to various points on Manhattan Island. Some of these churches have moved not once, but twice and even three times, in the effort to follow the drift of population.

An exceptional church would elect not to move, but to remain and entrench itself down-town. Trinity and St. Paul's in New York, the old Stone Church in Cleveland, Ohio, St. Paul's in Buffalo, N. Y., the First Methodist Church in Chicago are familiar instances of the down-town church. These churches have found their constituency in individuals and families living in all parts of the city, held by sentimental attachment to the old church; in the population of those down-town environs (usually living on an economic standard lower than that of the congregational average) and the floating down-town element. The out-of-town stranger at the hotel and a class of people in every city, designated in Chicago as "Loop Hounds," who simply love to come down-town, even on Sunday, make up the transient element to whom the down-town church especially appeals.

The extension program of the church bodies has for a long period shaped itself in accordance with these factors. Ignoring the specialized ministry to immigrant and industrial communities, which do not enter into consideration here, the groups responsible for city church extension have been under the necessity of finding some way of balancing the claims of the neighborhood church with a local appeal, and the down-town church which must, in the nature of the case, be both a family church and a mission station.

The extension of a subway or surface line stimulates the development of a new city neighborhood away out in the suburbs. A new church is established. Shall a member of a church down in the city retain his membership there, where his services and his financial contributions may be sorely needed, or transfer his membership to the new church right near his home? The children have usually been the deciding

factor. The trolley-ride down into the city proves too irksome for parents with small children. It has nearly always been found more convenient to send the children to the neighboring Sunday School. When the time would come for the children to unite with the church, they would go with their companions into the church in their own neighborhood. The ties of sentiment would have to be of extraordinary strength that would prevent parents from asking for their letters of transfer from their own old church to the congregation which had won their children.

The automobile has upset all these calculations. It is no hardship at all, but a pleasant diversion, to bring the whole family in the old bus down into the city.

ITS SOLUTION—TO CHURCH BY MOTOR

It is right here that the motor car has most profoundly affected the development of the church in the big city. It is obvious that the down-town church has found it easier to remain with the coming of the automobile. The flight of the churches to the suburbs has by no means been stopped, but it has been noticeably checked. The pastor of a widely-known church in Baltimore said that he was glad that he had resisted the suggestion to move from the down-town section a few years ago. He added that it didn't make much difference now in what part of the city the church was located, because his entire congregation was free to attend the church services independently of the trolley service. His opinion was that, by remaining at their present down-town site, this church was able to command the attention of the city in a way that would have been lost, had the church moved to an outlying section.

On the other hand, it is not easy to locate a new church in the outlying

districts with the same degree of confidence as formerly. Indeed, in the more well-to-do suburbs there is an element of danger in establishing a new church enterprise. The church edifice must be in harmony with the buildings surrounding it, which means considerable expense, while, at the same time, there is no assurance that the people of the neighborhood will sever their church ties in other parts of the city to come into the new church organization. The automobile is responsible for this element of caution. A new church in a fashionable suburb is seldom projected nowadays without first making a careful canvass of the neighborhood and ascertaining the wishes of the residents regarding a new church in their midst.

There is a popular impression that the automobile has affected adversely attendance at church service, but it is hard to find evidence to sustain such opinion. People who were interested in the church before purchasing an automobile are apt to continue that interest afterwards, and, as has been pointed out, a motor car facilitates attendance at church by the whole family. It is true that many people drive away from the big city for the week-end, but then it is equally true that people drive into the big city for the same period. It is more often the case than not that the good church member, who drives out of the city on

a bright Sunday morning and returns long after sunset, has attended church somewhere during the day. It may have been in another city a hundred miles from his home. The automobile has created a give and take in this matter of church attendance that just about cancel each other.

The automobile has had its greatest development within the past decade. The churches during that same period, making proper allowance for the demoralization created by the war, have maintained the same rate of growth as in previous decades, showing that the automobile has affected the life of the church very slightly one way or the other. It has compelled the restudy of the problem of locating churches in a given metropolitan area. It has introduced a new element of hazard in the establishment of new churches at the city's circumference. As to the future, it is generally believed that the motor car will prove an instrument of blessing to the church. It makes possible attendance on the part of the invalid and the aged, who without it could not attend public worship. It facilitates the work of the church in caring for the sick and the indigent. While it is to some a temptation, it is to others an opportunity. Increasing study will doubtless be given to the problem of making the motor car a real servant of the church in the coming years.

What the Automobile Has Done To and For the Country Church

By WARREN H. WILSON

Board of National Missions of the Presbyterian Church in the U. S. A.

SO many things are affecting the farmers that it is difficult to measure with precision the impact of one force. But of all the dynamic causes that are changing the aspect of the open country I suppose the automobile may be accepted as the symbol. It is itself a chief agency of change, and it is a channel of the forces of the larger world, a commodity of the city, a means of urbanizing the rural mind, a carrier of the news and a key to the market. It has released farmers from the vegetable existence of the farm. It has made the farm more desirable and valuable. All these have affected the church where farmers worship. But just how much and in what respects we have as yet not determined by measurement. There are churches in Pennsylvania which on Sunday morning are surrounded with acres of automobiles. I know two that have purchased land for parking purposes because more autos attend than horses in the old days. On the other hand, the abandonment of country churches goes on apace, as it did in the nineties, and some of them are disused because they are out of the path of motor traffic.

It was at first said that "the auto was killing the country churches," but I never believed it. The decadence of the open country church began before Elwood Haynes drove his first "horseless carriage" at the World's Fair. And besides the motor has brought people to church whom the horse would never have brought thither. Its influences have been both bad and good for the country church. The

religious forces are probably neither stronger nor weaker because of gasoline power. I know of no estimate of acceleration of the decay of the old-style country church within the years of motor transportation. The most solid gains as well as continued losses have been registered in the past two decades.

BENEFITS TO CLERGY AND PARISH

In the absence of any measurement of the influence of the motor upon the farmers' church in town and country one has to use observation and judgment. But whatever is said must be stated with the modesty and reserve suitable to a process the end of which is not in sight, its analysis unrecorded. I remember well the first pastor who testified in a meeting of his brethren in Montana to the gospel use of an automobile. He employed it for visiting the remote ranchers "above the ditch" on the semi-dry lands. His experience awakened a sensation. Another pastor in populous New Jersey about the same time purchased a car, to the indulgent amusement of his people, and used it to establish connections, on each Sabbath day, with eight services of worship, covering a wide area aforesaid neglected. I rode with him one Sunday over his circuit. He needed only two sermons, the same number as before, but he had quadrupled his professional efficiency. Not the least of his appeal was in the boldness and energy he showed and the swiftness, the long reach, of his attack upon their attention. How many rides across prairie and mountain have I

enjoyed since that time, by the side of preacher or superintendent! Every year the pace is swifter, the penetration of remote places more surprising. Nowadays the rural minister who has not a motor is a rare man. Even a "summer student," serving as apprentice in his vocation, may buy a car in June and sell it in September, having in the meantime enjoyed his work and served his people well.

When automobiles were first offered in the general market, ministers had already given up owning the traditional "horse and buggy." An assistant in my office, who toured the towns on the Alleghany River about the year 1910, reported his amazement that no pastor in those churches he visited owned a horse, though every manse had a stable, empty reminder of the faithful comrade of former rural ministers. The village church had already at that time lost its hold upon farmers, by reason of changes not proper to discuss here. The time was ripe for a new experience in transportation, and the automobile offered itself—apparently at that time an expensive toy. Then by some magic every minister began to buy a car. Like the farmers they served, they complained of poverty; but they found the means somehow to purchase vehicles, the cheapest of which was purchased at a cost twice the purchase price of horse and buggy new and of the best. I suppose, therefore, that one of the effects of automobiles upon country churches has been the supply of a needed medicine for rural meanness of spirit, a stimulant of better consumption. It has put the church upon a basis of better pay for the pastor's services, in that both he and his officers find that to "buy a Ford" does not impoverish them but increases their profitable efficiency. For automobiles are of all the purchases a farmer makes the quickest to depre-

ciate. It is of all the consumers' goods the most swiftly consumed. I suppose, therefore, that it has been an eloquent advocate of a better way of life. Farmers, who had been producers only, became in respect to one product eager consumers. They have a motive for approving the same sort of consumption in their ministers. The whole experience of motoring has been, I dare say, a revelation of the need of better pay for preachers and more generous support of the church.

CHURCHES MUST FOLLOW THE HIGHWAYS

It is a commonplace that the motors have demonstrated to conservatives the need of better roads. Their use has made possible a revolution in road-making. The new state and county roads are mobilizing the rural population. Villages that do not now offer satisfactions of the long-repressed wants of farm people are no longer even a stopping place of the automobiles, which carry their owners to the growing towns, where are offered first-class garage service with corresponding grade of moving pictures and street life. The county is being mapped again upon a larger radius of "going to town." In the Northwest, where the villages have not yet won a sentimental dominion of the farm population, this process shows itself in dried-up little hamlets that have ceased to grow, while others, spaced farther apart, are thriving upon the byproduct industries of motor transport.

Churches that are not on the lines of motor travel show uneasiness. Some that were about to expire have now breathed a last gasp unnoticed. While those meeting places upon the new highway, or near enough for convenience, see a future for themselves and hold their ground. One thinks of religious services that have been shifted

to new houses upon the highways. Naturally the village churches have profited by this faith. They were clustered originally in expectation of farmer support and now they live in hopes. If their faith and hope had only the supreme grace of love they would be the most religious institutions in America. In Texas there is a church in Collin County, six miles from each of three villages, which has built a new edifice and a new manse upon the county highway, only half a mile away from its former site. It is the delight of the countryside. Its services are well attended and special occasions are graced with the presence of the old throngs of one to three thousand, who come from far, as their fathers used, to see and meet people of like mind and condition. In Connecticut is an old church on a hill road now almost disused. Only an occasional funeral requires the opening of the padlocked door. But on the proposed motor highway that passes the foot of the little hill there is church service every Sunday afternoon in a community house, beside which the motors have found scanty parking space.

The automobile has sifted the attendance upon rural churches. One does not see so many young men and women there, to whom it provides so proper an expression of their speed and vivacity. Unless the minister is a man able to attract and hold the young they yield to the temptation to go somewhere on Sunday, and the church has a new reason for deploring their alleged irreligion. To the pastor of fertile spirit and contagious religious purpose the automobile brings a throng of young and old. Further, the church which is attended by families in motors is not so attractive to pedestrians as it was, and has a new distaste for those who are still dependent upon the horse

for motive power. The automobile has, therefore, made the country church even more a place of assembly of the middle-aged, and even more aristocratic than formerly.

I saw in western Nebraska the working of this force. We were trying to launch there a church among the ranchers on semiarid lands. Each rancher is possessed of a section of land and, therefore, the houses are on an average one mile apart. At a funeral of a rancher there were ten cars and one farm wagon; and after the services in the shabby little four-room house the coffin was laid across the rear doors of a big seven-passenger car, two men being first seated in the rear seat to watch and steady it. It was securely bound and the procession started for a graveyard fifty miles away. The farm wagon did not offer to follow. There was no place for a horse in that procession, at a speed of sometimes thirty miles per hour over the rolling prairie. The occasion was an impressive comment upon our attempt to maintain a resident pastor and a church so far from a focus of rural habit and sentiment. Soon the pastor moved to town and no other has moved out to take his place.

The automobile is a vehicle for the assembling of people from a wide area at a center and for reaching all the farms of the area with services that center at a convenient point. One would suppose that it would reinforce the village churches, but that is still a question. Only a religious force can accomplish an effect in religious construction. The village has shown in recent decades no new leadership commensurate with the changes going on in city life and in agrarian organization. Village ministers as a rule are convinced that their relations are with the cities, not the farms. So long as

their backs are turned upon the farmers the farmers will turn a cold shoulder to the village church.

SUCCESS OF PARISH ORGANIZATION

There are, however, a few villages in the Middle West, where an agrarian psychology prevails, whose churches are attended by farmers. And on the Pacific Coast the surveys show a marked gain in village attendance by farmers going to church. But generally the religious condition of a farmer is measured by his support of the open country church or the meetinghouse in the hamlet. Until this day it is unfortunately true that as the open country church dies out farmers become irreligious. In this the automobile has wrought no general change.

Seeing this dual effect of motor transportation, a few foresighted religious men have planned what we call the larger parish. In the Rocky Mountain region, at Montrose, Colorado, and at Lingle, Wyoming, are examples of parish organization in which two or three ministers are organized upon the basis of collective service of a wide area; the radius of which is no longer the "team-haul," but the distance a minister can travel between Sunday services,—say ten or twenty miles. These larger parishes serve a scattered population, who have not yet fully "proved up" on their home-

steads, much less on their permanence of residence. They are experiments. In Michigan at Benzonia and in New York at Glens Falls are other instances of parish organization, in which assistant pastors minister to farmers and the dwellers in hamlets, under town and city leadership. The physical equipment of all these plans is the automobile.

In the development of the new vocation of supervision of churches the automobile is an essential. We are beginning to have men of energy and scientific temper in charge of rural church work. These men all own fast, powerful, small cars. They are making speed, in both a geographic sense and a sociological. The hope of the rural church is, in my judgment, with these men. It does not follow that because country people have automobiles they will go to church at a logical—a "strategic"—center. There are many poor who have none, many children who have command of none, and sick who could not drive a motor. The church lives and breathes by its help rendered to these hindered and hampered persons. Until we have covered the country with a system of motor-busses like unto the "kid-wagons" in consolidated school districts, we cannot regard the automobile as a determinant in the organization of rural religion.

Function of the Motor Truck in Reducing Cost and Preventing Congestion of Freight in Railroad Terminals

By T. C. POWELL

Vice-President, Erie Railroad

HISTORY records the failure of man to predict with any marked success the course of future events or of the consequences of any action.

This comment applies with great force to the subject of transportation.

The first railroads in England (and which preceded those in America) were projected with the idea that they would carry freight and not passengers (except in a very minor degree). As a matter of fact they were immensely popular as passenger lines while the freight tonnage fell below expectation!

On the other hand, the first self-propelled vehicle (or steam carriage) operated on the highways of England was a modified stage coach for passengers only, but the public accepted it very slowly and the influence of the owners of the coaches and public inns was sufficient to drive the steam carriage off the highways and into oblivion.

The "Steam Road Carriage" has now become the automobile of today and the auto truck has taken over an immense freight tonnage and can give a service supplementing that of the steam railroads, and which, properly directed, will economize in terminal service for the benefit of all concerned.

The steam railroads of America have never hesitated to assume any transportation burden placed upon them—from handling freight cars of 70 tons' capacity or greater, to running across the continent at passenger train speed and even faster, trains of silk from the Orient worth millions of dollars, de-

pending upon fast schedules to save the owners the cost of insurance and interest charges.

But neither in this country nor abroad can the railroad managements overcome the inertia connected with the handling of freight cars through the rail terminals, if dependent only upon the locomotives as motive power and the limited area of the railroad freight warehouses for distribution! The relief, therefore, must be found in the use of a more mobile vehicle than the freight car propelled by a steam locomotive.

MOTOR TRUCKS TO THE RESCUE

Such a vehicle is the self-propelled motor truck which is of three kinds, *i.e.*, internal combustion or gasoline, electric and steam, the last two being in the minority.

The self-propelled motor truck may be supplemented by "trailers" of equal or greater capacity.

The railroads have realized for years that the cost of real estate in large cities, necessary for the enlargement of terminal yards and station buildings, has become prohibitive; besides realizing, also, that such facilities are so rigid and immovable as to limit their usefulness in developing the business of the community.

The delay in availing of the convenience of the motor truck for terminal service may be partly ascribed to fear of competition on long haul traffic; and motor truck operators must admit that a good deal of their propaganda in

the past has appealed to the prejudice of the shipping public and not so much to their common sense.

Nothing will be gained by attempting to drive out the steam railroad by prejudice.

The governing factors will be *Expense vs. Economy*.

The ultimate design of a railroad steam track yard and a railroad freight warehouse will take into account the following:

1. A location with relation to the business community, which will insure a fanlike collection and distribution of freight by motor truck; such trucks being operated by the railroad company, or by separate corporations under contract with the railroad or by individuals or corporations responsible to the shippers and receivers of the goods.

2. An arrangement by which solid cars of freight of one commodity, or of various commodities for one party, may be placed under cover in such a position with relation to the roadway as to permit easy and quick access by vehicles; prompt loading of such vehicles and immediate delivery to those consignees equipped to receive their goods without delay. In lieu of such facilities on the part of consignees there should be provided storage warehouses to which the various commodities may be transferred and stored ready for subsequent disposition by the owner.

3. The provision for less than car-load consignments is different only in degree, but after a car containing various consignments for different parties has been placed for unloading, there should be an immediate transfer of the contents to a vehicle for delivery to the consignees or to a warehouse located so as to serve the territory in which the consignee is doing business; that is to say, every handling of a package

should carry it closer to its final place of deposit in the hands of the owner.

4. The freight cars so relieved will be available at once, after inspection, for a return load.

5. Now comes the problem of out-bound shipments, which, in the nature of things, is more complicated than in the reverse direction.

The end and aim of any change in the present methods is "flexibility and speed." A waiting vehicle is an abomination!

The method of collecting freight for loading into railroad cars prevalent in London, England, in 1850, was as follows (modernized wording):

A multitude of carts and vans, which serve as a sort of tenders to this department of the railway business, are employed in radiating through every part of the capital, which they sweep over and collect such parcels of goods as are individually too small to be sent by their expeditors by separate wagons. These, with the larger and heavier parcels brought by independent drays and wagons, arrive without interruption during the day and a great part of the night at the station of departure, on the platforms and under the sheds of which they deposit their loads. They are received by the loading porters, and way-billed by clerks stationed on the platforms for the purpose. The smaller parcels, which are extremely numerous, are rolled in barrows and trucks, after being sorted and classed according to their destinations and qualities, to the freight cars in which they are to be transported. The larger articles are seized by cranes, lifts, capstans and other machinery, much of which is worked by steam power, and expeditiously laid on their respective cars, having previously undergone the process of weighing and waybilling.

I see no reason why this description of 74 years ago should not apply to a railroad terminal of 1924 operated with the co-operation of the shippers of today.

6. Such delivery direct to the railroad freight stations and team tracks

should be supplemented as in the reverse direction by intermediate warehouses and "off line stations" so that the "extremely numerous" small parcels may be delivered into the custody of the railroad by trucks operated by, or under control of, the shipper, in order that the shipper's premises may be relieved as frequently as possible.

This plan also enables the railroad companies to unite in a common convenient receiving depot which, as above described, may also be operated as a common delivery or transit station on inbound freight.

The experience of the Erie Railroad in New York demonstrates the practicality of this plan.

Distribution of Gasoline and Methods of Price Control

By HUSTON THOMPSON

Washington, D. C.

AT the present time about 85 per cent of the total quantity of gasoline consumed in the United States is sold to the retailer or ultimate consumer either by the company manufacturing it or by an affiliated or subsidiary concern. The remainder is purchased by wholesalers F. O. B. plant from the smaller refiners. Gasoline is distributed in wholesale quantities in tank steamers, tank cars, motor tank-trucks and horse-drawn tank-wagons. The large refiners distribute gasoline from their refineries to the principal marketing centers in tank steamers and tank cars. Tank steamers are used extensively for coastwise shipments from refineries on San Francisco Bay and in southern California to the large markets of the Columbia River and Puget Sound regions. During the last two years millions of gallons of gasoline produced in California have been transported by tank steamer via the Panama Canal to the Atlantic Seaboard. Daily entire trainloads of gasoline in tank cars, destined for large consuming centers, leave the important refining regions of the Rocky Mountain and Mid-Continent oil fields and the large refineries farther east.

Adequate storage facilities are maintained in the large cities along the Atlantic, Gulf and Pacific Coast and at important interior refining points from which the requirements of the retail dealer are supplied. The seasonal demand for gasoline necessitates the accumulation of large stocks during the winter months in order to meet the requirements of the heavier spring, summer and autumn trade. The bulk of the retailers' supply of gasoline is distributed by tank-trucks or tank-wagons from storage tanks located near railroad sidings. Tank-truck and tank-wagon drivers usually sell at retail to anyone on the route who will buy five gallons or more at a single purchase.

The great bulk of the gasoline used as a motor fuel for automobile and other internal combustion engines is a blended product. Formerly only "natural" or "straight run" gasoline, obtained by distilling petroleum by the application of heat at atmospheric pressure, was sold for motor fuel purposes. But in recent years, due to the tremendous increase in gasoline consumption, large quantities of "casing head" gasoline, extracted from natural gas, and of "cracked" gasoline, produced by a number of cracking processes applying

very high temperatures to gas and fuel oils while under superatmospheric pressure, have been produced to supplement the supplies of natural gasoline. These products are blended by the manufacturer before being sold to the trade. The yield of gasoline has been increased greatly by the widespread use of cracking processes. A refiner using Mid-Continent crude can recover from 45 to 55 per cent of gasoline from a barrel of crude petroleum when pressure stills are used, as compared with about 25 per cent from ordinary distilling methods. Improvements in internal combustion engines should soon make possible the utilization of a still larger yield of serviceable motor fuel than is now obtainable in the form of gasoline from cracking processes.

HOW GASOLINE IS SOLD

The gasoline business of this country is conducted by two general types of companies. The first includes the large integrated companies with extensive investments which are engaged in several branches of the industry. Indeed many of them, either directly or through subsidiaries or affiliated companies, are engaged in producing, transporting and refining crude petroleum and in marketing gasoline both at wholesale and at retail. The other type of companies is those engaged in but a single branch of the industry such as wholesaling or retailing.

There are four kinds of gasoline prices: (1) refinery prices, at which gasoline is sold to wholesalers and jobbers, in tank car lots; (2) the tank-wagon price, which is the wholesale price to retail dealers such as garage men and service station operators; (3) special prices to large consumers, which are usually one cent over the wholesale price; and (4) the retail or service station price, which is the price charged the ultimate consumer.

Refinery sales are made both at current or spot prices and on contract. It is a common practice at the present time for wholesalers and independent refiners to base their contracts upon the tank-wagon (wholesale) price of the Standard marketing company in the territory to which shipment is made. Fixed differentials between the wholesale and retail prices of gasoline are maintained by the large gasoline marketing companies. This margin is two cents per gallon in some sections of the country and three cents in others. At some points where the large marketing concerns do not maintain service stations much larger differentials are added; for example, the Federal Trade Commission discovered cases in Montana in which retail concerns (engaged only in intrastate trade) sold at from five to ten cents per gallon above the wholesale price,¹ and the Commissioner of Agriculture for the State of Minnesota reported on November 14, 1923, that:²

The ordinary gross retail margin is two cents per gallon on gasoline, though a spread as great as eight and ten cents has temporarily existed.

The failure of wholesale and retail dealers to pass the benefits of price reduction on to the consumer has led to the establishment of co-operative retail stations in different sections of the country and to the sale of gasoline by the state or municipality in other places. After a careful inquiry into conditions in Minnesota in the summer of 1923, the State Commissioner of Agriculture reported that with one or two exceptions "all retail dealers took advantage of the extremely high prices prevailing during the summer of 1923," and that

¹ *The Petroleum Trade of Wyoming and Montana*, p. 1.

² Bulletin No. 30, *Report of Investigation of Gasoline and Kerosene Prices and Methods of Distribution*, p. 15.

"it is apparent that the motor vehicle owner has no relief or protection against excessive gas and oil prices under current conditions in Minnesota except through the organization and maintenance of co-operative stations."³

BEFORE AND AFTER DISSOLUTION

In order to make clear the present situation with respect to price control in the sale of gasoline, it is necessary to call attention to certain facts with respect to the dissolution of the Standard Oil Company. At the time of the Standard Oil dissolution, effective in December, 1911, the Standard did 85 per cent of the total domestic business of the United States in refining and marketing petroleum products. The few independent refiners and marketers then in business were allowed to exist merely by sufferance to give an appearance of competition.

The only branch of the petroleum industry in which the Standard did not do the bulk of the business was that of production. As the crude-oil producing business is a hazardous one, the Standard was willing to allow independents to develop production, the bulk of which it purchased at the oil wells at prices announced or posted by its purchasing agents.

It is still customary in the business and financial world as well as in general practice to distinguish between two groups of interest in the petroleum industry; one group includes companies which were subsidiaries of the Standard Oil Company (New Jersey) at the time of the dissolution and of companies since acquired by any of the Standard units, while the other group embraces all other companies, which are commonly referred to as "Independents." While in this discussion the Standard companies are frequently referred to as

a group, it should be borne in mind that since the dissolution each unit has maintained a separate organization, each having separate officers, directors and refining, transporting and marketing equipment.

Since the dissolution the generally prevailing prices of gasoline and other petroleum products have been those named by the several Standard marketing companies, notwithstanding the fact that the proportion of the business done by independents has steadily increased until the percentage is now about three times as great as it was in 1911. Large independent companies such as the Gulf Oil Corporation and the Texas Company east of the Rockies and the Union Oil Company of California on the Pacific Coast, are now as large as some of the larger Standard units.

MAINTAINING PRICE CONTROL

The maintenance of this price leadership in practically all parts of the country has been chiefly due to the fact that, with only minor exceptions in recent years, the different Standard units have not competed with each other in the purchase of crude nor in the sale of gasoline at retail, but in these respects have apparently continued the harmonious business relationships of predissolution days. For example, prior to the dissolution, the Prairie Oil & Gas Company in the Mid-Continent Oil Field, and the Seep Purchasing Agency in the Appalachian Field, acted as the crude oil purchasing agents for several Standard refining companies. This practice was continued unchanged for a number of years and still exists with some modifications, with the result that there has been little price competition between these Standard refineries in the crude market. Likewise the Standard pipe line companies have practically served

³ *Ibid.*, pp. 14-15.

only Standard refineries, notwithstanding the fact that in 1914 the United States Supreme Court upheld the constitutionality of the Hepburn Act declaring interstate pipe lines common carriers. The use of these pipe lines by Standard companies, while eastern independents were at first denied their use and later prevented from using them through onerous shipping requirements, probably has been the most important factor in enabling the Standard companies east of the Mississippi River to maintain their dominant price leadership.

As the chief element in the cost of producing gasoline is the raw material—crude petroleum—the harmonious relationships of Standard companies enabled them to secure their crude on more favorable terms than their competitors. The proportion of the total cost represented by the cost of crude varies with the price of the crude—the higher the price the greater is its percentage of the total cost. Consequently, the development of eastern independents, being prevented from availing themselves of a cheap and abundant supply of crude from the Mid-Continent Field on equal terms with Standard plants, has been stunted and they have not become an important factor in competition. The only independents that have become large factors in the petroleum business are those having their own pipe line systems, such as the Texas and Gulf companies. An inquiry into petroleum refining costs made by the Federal Trade Commission, which included the costs of five large companies running 90 per cent of the total quantity of crude petroleum refined in the Pacific Coast territory, shows that in 1919 the cost of the crude represented about 80 per cent of the total cost of refining when the average cost of the crude was 95

cents per barrel, but that the proportion was over 90 per cent when the average crude cost was \$1.63 per barrel.⁴ East of the Rocky Mountains, particularly near the Atlantic Seaboard, the proportion would be still higher. At the present time pipe line charges from the Mid-Continent Field to the Atlantic Seaboard constitute about 50 per cent of the delivered cost of the crude, consequently they are an important factor in gasoline costs.

In 1916, the Federal Trade Commission issued a report which called attention to the following important facts: (1) that "pipe lines are as fundamental a factor for the oil industry as the railroads are for agriculture"; (2) that the pipe line rates then charged were exorbitant; and (3) that competition in the petroleum industry would be promoted if the smaller refiners were enabled to use the existing lines under reasonable rates and equitable shipping conditions.⁵

The fact that small independents have not been able, generally speaking, to use the large interstate pipe lines as common carriers has resulted in the location of the vast majority of their refineries in the immediate vicinity of the large oil fields and thus prevented them from becoming a competitive factor in the large consuming centers, because it is much cheaper to transport crude petroleum by pipe line to such centers than to refine it in the oil fields and transport the gasoline by rail in tank cars. The only sections of the United States in which a reduction in crude prices is surely and promptly followed by a reduction in gasoline

⁴ Report on *The Petroleum Industry of the Pacific Coast*, Part I, p. 183, and Report on the *Price of Gasoline in 1915*, p. 15.

⁵ *Pipe Line Transportation of Petroleum*, pp. XXVIII and XXXII.

prices is in Oklahoma and Texas, which are near these large independent refining centers.

The continued harmonious business methods of the former members of the Standard Oil combination is further evidenced by the fact that they have, with only two important exceptions, continued to market gasoline at retail in the same way as before the dissolution. The Standard marketing territories, in almost all cases, arbitrarily follow state lines. In some sections the marketing territory is confined to a single state, as in the case of the Standard Oil Company of Ohio and the Standard Oil Company of Nebraska, while in others the marketing territory embraces a number of states, as in the case of the Standard Oil Company (Indiana) which sells gasoline at retail throughout Michigan, Wisconsin, Minnesota, North and South Dakota, Iowa, Illinois, Indiana, Missouri and Kansas.

POWER OF THE STANDARD GROUP

During the last few years some of the Standard group have exhibited a greater degree of independence than formerly with respect to this phase of their business. The most important example is that of the Atlantic Refining Company, which has extended its wholesale and retail gasoline and kerosene business into Massachusetts, Rhode Island and Connecticut, originally the marketing territory allotted to the Standard Oil Company of New York.

Two reports of the Federal Trade Commission describe these Standard marketing territories.⁶ The Commission's report on the *Price of Gasoline* in 1915 shows that arbitrary price differences frequently existed in neighbor-

ing towns located in different states. This was strikingly illustrated in the case of towns in the states of Idaho and Washington, the former in the territory served by the Continental Oil Company, and the latter by the Standard Oil Company (California). The same situation existed in the border towns of Indiana, Ohio and Kentucky, which are served by the Standard of Indiana, Standard of Ohio and Standard of Kentucky, respectively. It was found that the inequalities in prices in such cases were often two cents per gallon and ranged as high as eight cents.

It is the power of the various Standard companies to dominate the situation which prevents freedom of competitive action. In testimony before the Committee on Manufactures of the United States Senate in 1922 and before the Federal Trade Commission in 1916, representatives of the different independent companies and organizations called attention to the fact that they feared the Standard's power. For example, R. L. Welch, then general counsel for the Western Oil Jobbers Association, stated:⁷

I don't believe there is a jobber in our organization who can survive who does not follow the market of the Standard Oil Company, and so far as I am concerned I would advise them to do so.

When asked whether the members of his organization sold at higher prices than the Standard, Mr. Welch testified:

Occasionally here and there some one has risen above it, but whenever he has done it he has lost enough gallanage to get his lesson.

The Federal Trade Commission's inquiry into competitive conditions in the Pacific Coast territory shows that following a period of keen competition

⁶ See reports on the *Price of Gasoline in 1915* and the *Pacific Coast Petroleum Industry*, Part II.

⁷ *Federal Trade Commission Report on the Prices of Gasoline in 1915*, p. 137.

in 1914 and early 1915, during which a number of independents went bankrupt, the independent marketers organized an association, and that:⁸

Since September, 1915, members of the association agreed among themselves to maintain the prices announced by the Standard Oil Company (California), and in order to maintain these prices they adopted the same differentials and classifications of customers as were used by the Standard. They listed and, pursuant to agreement, refused to sell to retailers who sold below the agreed price until such retailers maintained list prices.

This was still the situation when the Commission completed its inquiry in 1921. It is interesting to note in this connection that the records of this association did not disclose any reference to price discussion, but that a very complete record of their price agreements was found in unsigned memoranda. At a hearing before the Commission the secretary of the association stated in response to a question by Commissioner Murdock that after adjourning the regular meetings—⁹

They go out arm in arm. The chances are they haven't seen each other for a week. After the crowd is outside they do the real thing they are interested in.

The harmonious relations which continued to a marked degree for a dozen years after the Standard dissolution, resulting in a continuance of monopoly control of the entire petroleum industry, are undoubtedly due to the interlocking of stock ownership resting in the hands of a few persons.

The dissolution decree allowed the stock in the subsidiaries of the Standard Oil Company (New Jersey) to be

distributed ratably among the stockholders, the provisions relating to distribution of stock being as follows:¹⁰

But the defendants are not prohibited by this decree from distributing ratably to the shareholders of the principal company the shares to which they are equitably entitled in the stocks of the defendant corporations that are parties to the combination.

The shares in each of the subsidiary companies which were formerly held by the Standard Oil Company (New Jersey) were distributed ratably among the stockholders and the control of each subsidiary passed from the holding company to the persons who had dominated the Standard Oil combination.

Testimony before the Senate Committee on Manufactures during 1922 disclosed the fact that certain formerly important stockholders had disposed of their holdings in some of the larger Standard units; and that within the last two or three years the stock has become quite widely distributed. For example, it was testified that John D. Rockefeller, Sr., was no longer a stockholder in the Standard Oil Company (Indiana) and certain other Standard units. The lessening of the degree of interlocking stockholdings by the group of capitalists formerly controlling the various Standard units may account for the fact that in certain phases of the petroleum industry some of the Standard units are now displaying more independence; for example, the Standard Oil Company of Indiana and the Standard Oil Company of New Jersey no longer purchase all of their crude petroleum in the Mid-Continent oil field from the Prairie Oil & Gas Company.

The greatest menace to future improvement in competition in the sale of gasoline and other petroleum

⁸ *Pacific Coast Petroleum Industry*, Part II, p. X.

⁹ *Federal Trade Commission Report on the Pacific Coast Petroleum Industry*, Part II, p. 193.

¹⁰ 173 Fed. Rep. 177, 199, Sec. 5.

products appears to be the establishment of greater control in certain Standard marketing territories through the acquisition of independent interest. For example, during the past three years the Standard Oil Company (Indiana) acquired the Midwest Refining Company, which was already the dominant factor in production and refining in the Wyoming oil field. Notwithstanding the fact that the Wyoming and Montana producer of crude petroleum receives a lower price for his product than producers in the Mid-Continent and other oil fields east of the Rocky Mountains, the consumer in Idaho and Montana is forced to pay a higher price for gasoline

because the Standard charges higher prices for shipments into those states than for shipments into territory tributary to the independent refining center at Tulsa, Oklahoma.¹¹

The situation with respect to price control in the sale of gasoline was summarized in a recent report of the Federal Trade Commission as follows:¹²

Price initiative today seems to be left generally to the Standard companies, and competition is apparently more directed to developing facilities for getting business than in seeking to obtain it by underselling.

¹¹ Federal Trade Commission, *The Petroleum Trade in Wyoming and Montana*, p. 2.

¹² *The Advance in Price of Petroleum Products*, p. 53.

The Billboard and the Public Highways

By J. HORACE MCFARLAND, L.H.D.

President American Civic Association

NO one who uses the improved highways that the automobile has made necessary in America can have failed to take cognizance of the many advertising signs that border these better roads. In fact, the "billboard," as it has come to be universally called, whether the sign be painted on a building, or raised above it, or elsewhere displayed in the public view, is an almost unfailing evidence that the highway from which it is seen is a much traveled road.

It is scarcely here in point to discuss the origin of the billboard, beginning in legal announcements, familiarly known at first to the older citizens of America through the circus poster. It is in point to mention its tremendously rapid growth and to call attention to the significant fact that the billboard is the one method of advertising in the civilized world against which many legal enactments have been framed,

upon which numerous court decisions have been made, and in relation to which large bodies of citizens have attempted and are continuing vigorous adverse action. The billboard alone seems to require regulation, repression and possibly even abolition—at least in some locations—according to the thought of judges, editors, highway authorities and civic organizations.

ADROIT PLEAS AND ARGUMENTS OF PROMOTERS

That the billboard "industry," as it has come to be called, is extensive, has been made apparent recently in pleas for its continuance made by some of its promoters, who justify its existence seemingly more by the employment it gives and by the items of commerce it uses, than by any value it is presumed to render to those who pay for it.

For example, a well-meaning woman who has been shrewdly won to its de-

fense by its astute promoters, has just written me of the pathetic situation she believes might confront a hundred young women who are clerically employed in the office of one large concern in New York, should the growth of the industry be interfered with. The controlling authority of another New York and national billboard-erecting company boasted to me not long ago that his organization "purchased more paint and more electric light bulbs than any other concern in America," letting slip at the same time the information that one electric sign on Madison Square brought to his company a revenue of \$5,000 monthly, with a limitation of not more than one year of occupancy to any single advertiser. He raised the same plea that the woman in question extended to me, in saying that he employed seven thousand men, and that some rolling-mills producing sheet steel would undoubtedly be idle if his business was not extended, while many printing presses might cease to run under the same condition. He claims to do a business in billboards of \$27,000,000 annually.

WHY THIS INTERFERENCE?

It may therefore properly be inquired as to why there should be this interference with the billboard as a means of advertising in a nation in which advertising has confessedly been beneficial in building up business and improving living conditions. Very plaintively the big billboard men and their astute attorneys will ask the same question. Did they not contribute invaluablely to the national defense when they provided space—at a price—for Liberty Loan announcements? Have they not recently adroitly entrapped a President into the issuance of a quasi-commendatory letter on the occasion of a meeting of one of their national organizations? Was

not their eruption of religious posters several years ago an evidence of their high virtue? Have they not banned—just about two jumps ahead of legal action—all questionably decent advertising?

WHY THE PUBLIC OBJECTS TO THE BILLBOARD

The basic reason for public objection to the billboard has been aptly phrased by one critic, who says that "It sells the eyes of the public" without the consent of the public, differing in that respect completely from any other method of advertising. Only the blind man can avoid seeing the billboards along the highways, day or night, for the recent enterprise of illumination makes the billboard more glaringly obvious at night than under the light of the sun.

This major reason for objection has many divisions. One of these is that it is the obvious purpose of the billboard-erecting concerns not only to force the user of the public highway to see the announcements displayed, but to use the vast public expenditure for bettering these highways for private advantage without any or with but little compensation of any sort to the paying public.

An example may be cited in a certain twenty-mile stretch of new concrete road in northern Pennsylvania, leading along a lovely stream up through wood-covered hills to a summit of more than a thousand feet higher, and giving access to scenery of real magnificence. The million-dollar cost of this road has been taken advantage of by a hundred great billboards, besetting it always at points of scenic attraction, as when the road turns, and in one particular case involving the erection of a tremendous red sign advocating the purchase of Hood tires, right where one must

seemingly run into it crossing a bridge over the beautiful watercourse which gives name to the valley.

✓ It is urged that these billboards are enforcing upon the highway erected at the public expense what the lawyer calls a "servitude," not contemplated at all in the relation of the highway to the abutting property, despite the fact that the billboard, at least in Pennsylvania, must be—save for the tens of thousands of "sniping" signs illegally placed—always on private property. If a property owner erects a building upon his land facing the public highway, whether or not that building brings him direct revenue, the tax assessor at once takes cognizance of it as an "improvement," and he pays in taxes on increased valuation. Not so for the billboard, which, although it does bring revenue to all concerned except the "poor fish" who pays the bills as an advertiser, almost wholly escapes taxation.

✓ Another objection properly holding against the billboard along the highway is its continual interference with the convenience and safety of the passing motorists. Only when forced off does the billboard abandon a location that may have obscured a turn or a railroad crossing, or flanked a school so as to keep out of sight the children playing upon the highway. Constantly also the smaller signs coming within the "billboard" designation confusingly obtrude themselves to divert attention from the needed and most desirable road signs directing the passer-by on his way. Indeed, right here it does seem as if in the interest of our enormously increasing traffic all billboards visible from the public highway, in their diversion of attention as well as in their actual interference with safety, might properly be declared to be dangerous nuisances.

No stress need be laid on the inter-

ference by the billboard with the beauty of the scenery in which it is placed, because that has been the main count in the indictment against it, and I have yet to meet a passing motorist who is other than aggravated at that interference. It is in point to recite the loss of dignity on the road and in communities which is in evidence when, as until recently was the case, great billboards hugged close to the National Capitol. The billboard men are ambitious, as was apparent when I read several years ago an announcement in the advertising part of a New York surface car that "The moon as a billboard would be at a discount compared with the service we offer." When I saw the historic majesty of Lookout Mountain, near Chattanooga in Tennessee, punctured here and there with great signs advertising various patent medicines, I could not feel that those who erected these signs and those who paid for their erection were much less than traitors.

In the development of the past few years it has been made apparent that the billboard as an advertising device is a parasite upon other forms of advertising, which neither take advantage without compensation of great public expenditures nor force unwilling attention. The value of billboard advertising can hardly be successfully traced, and it almost invariably depends on operating with other forms of advertising that may bring the profitable results for which it claims credit. Being as it is the only form of advertising legally restrained and regulated and socially objurgated, as I have above noted, it seems now to be rapidly becoming a method of showing the passing motorist what *not* to buy, rather than otherwise.

While its major victims are the public it offends, its cash-paying victims are the advertisers it deludes. None of

these would ever spend money to intentionally defeat sales of their particular products, and yet the excesses of outdoor advertising committed by the billboard are rapidly tending to accomplish just that result. For example, I know of one man in Florida, himself an active and vigorous advertising business man, who carries in his car a short crowbar, with which he regularly tears down signs erected during the day along the pleasant highway that takes him home in the evening. Further, he has equipped several of the trucks he uses with proper lengths of wire rope, and in some way these seem to get entangled with the larger signs so that they do not stay up! This man declares that he has a right to see the beauty of the landscape, and he proposes to maintain it by this sort of force, against which so far no billboard man has been willing to attempt legal action. What folly it is for other business men to pay money for the erection of signs thus being destroyed to disadvantage to all except the exploiting company that does the erecting!

I have been told of another proposition, which is that the outraged users of the public highways, passing over the roads they are helping to pay for, be provided with a small spraying machine charged with a suitable liquid to be used to successfully deface the obtruding signs that interfere with the safety and the pleasantness of the highways. Of course this would be an illegal intrusion on private property, but I doubt whether any billboard-erecting concern would dare to prosecute those who might make this attempt to protect themselves, for the reason that it would be necessary to show value in these advertising signs, and that value, I think, can be successfully shown to inure only to the exploiting erecting companies, and not to the deluded ad-

vertiser whose money makes possible the continuance of the billboard.

Letters I have recently read from the heads of the great tire-making concerns indicate that these gentlemen are quite dubious as to the value of their announcements enforced upon motorists who may use their tires, by their presence along the otherwise beautiful highways of America. I take it that many thousands of motorists may soon come to my own feeling, that I never need to buy anything whatever advertised in this objectionable way.

LEGAL OBJECTIONS

This resistance to the billboard by extra-legal methods is particularly in evidence in the action of a national committee headed by a most energetic woman, Mrs. W. L. Lawton, of Glens Falls, New York, which committee is causing to be written thousands of letters to advertisers, courteously requesting them to refrain from further billboard advertising, save in selected and segregated commercial locations, so that there may be a little left of the beauty of the land we love.

It is important to note that these efforts are met at once by information as to the existence of long-time contracts obtained by the astute sign-erecting concerns, by which, despite any public objection, they can not only enforce the continuance of their billboards to their own benefit, but can hold up the deluded advertiser to the time limit. It is proper to make warning that, wherever a new concrete road or other improved highway is completed, the representatives of the billboard-erecting concerns are at work obtaining—usually at very trifling compensation—from the abutting property owners the advertising rights which are later to be exploited to the disadvantage of everyone save these companies themselves. In one case

within my knowledge a movement is on foot to protect a lovely Pennsylvania valley by contracting in advance for a term of years for all the advertising rights along the new highway, in order to keep out the advertiser.

I have above alluded to legal objections to the billboard. For many years enactments have been attempted to restrain, tax, and even to abolish, billboards. Invariably these are ably and vigorously combatted by the attorneys of the billboard-erecting concerns, who, with national organizations amply supplied with funds, are ready to provide the best lawyers to go anywhere, should the spread of their business be interfered with by an attempt at legal control. Yet despite this expensively maintained defense, the public-spirited citizens who have fought in various parts of the country have managed to get into the law of the land and into court decisions some real advances toward restraining the excesses of the billboard.

RESTRICTIVE LEGISLATION

For example, dealing wholly with the billboard as interfering with the public safety, the United States Supreme Court has sustained the decision of the Illinois Supreme Court in the case of *Cusack versus Chicago*, 242 U. S. 526, 1917, which makes it possible in that state, without constitutional changes, to prevent entirely the erection of billboards in residential neighborhoods. It is believed that similar authority exists in most of the states.

Massachusetts has led in authorizing the regulation of the billboard under the police power, just as the saloon was regulated, in a constitutional amendment adopted in 1918, which recites that "Advertising on public ways, in public places, and on private property within public view, may be regulated by law."

It took St. Louis many years to successfully sustain its own effort to very slightly restrain billboard excesses by exercising control under the police power, but the principle was established again in the United States Supreme Court, and also not for æsthetic reasons.

Although courts have shown a disinclination to accomplish physical restraint for reasons of beauty, and this attitude has been taken advantage of by the billboard concerns to "uglify" the countryside, as Dr. Charles W. Eliot puts it, nevertheless the approach to regulation in the interest of retaining beauty is proceeding. For example, a decision was handed down by the Supreme Court of Minnesota, in which the learned judge said, "It is time that courts recognized the æsthetic as a factor in life." Other courts, particularly in California, have definitely spoken in the same direction, and it is believed that if the issue was joined and the case intelligently fought, many decisions would come to recognize the right of the eye to protection at least to the same extent as protection is now given to the ear and to the nose.

But at present legal restraint of the billboard can, it is believed, be accomplished without reference at all to the offense to the eye which it usually constitutes. There is no question as to the control of billboards by the police power. The power to tax is also established, and there are good lawyers who insist that this power may be exercised to the point of abolition, though there also are available court decisions to show that any tax other than that relating to inspection is held to be "unreasonable."

It is a mournful fact that existing laws are not availed of. In Pennsylvania, for example, as well as in the great state of New York, no sign can legally be maintained on public prop-

erty, whether it be in the possession of the state or any community within the state. Nor can any sign be erected on private property in Pennsylvania—aside from required legal notices—save by previously obtained written consent of the owner or tenant. The penalty for violation of this act—a fine of not less than five dollars nor more than twenty dollars—would, if enforced in Pennsylvania alone on any one day, mulct obvious offenders in all the cities and on most of the highways by not less than five millions of dollars. Further, any sign so maintained is declared in Pennsylvania to be a nuisance, and as such may be abated (by removal) by any citizen.

In view, however, of the increasing intrusions of the billboard along the main-traveled highways of which we in America are beginning to be proud, it is in point to suggest inquiry into the possibility of further restrictive legislation. It has been proposed in one case, for example, to consider that any sign which may be visible from any highway maintained in whole or in part by the state, should be under state control for safety purposes, and that a permit be required from a centralized state authority for the erection of such sign, with various restrictions as to size, location, and particularly as to designation of the person responsible for it. There is no doubt that such an enactment could carry a liberal fee for inspection and licensing. There is doubt in the minds of some who dislike billboard intrusions as to the propriety of recognizing the billboard by licensing it at all, but it would seem as if this point of view was rather academic than practical, for no legislature or Congress could or would as yet pass, and no court could or would as yet construe as constitutional, an enactment absolutely wiping out billboards in whole or in part.

Another approach is considered feasible by good lawyers. It is through an instruction to the taxing authorities of every civil district to consider a billboard of any sort as an "improvement" in the eye of the law, to be assessed for taxation as other improvements are assessed, this tax relating to the property as a whole, and not to the billboard as such, and being not less per acre than a minimum sum stated in the act. Such an enactment would make the farmer who knew about it think twice before he endangered the assessment on his property by yielding to the blandishments of the billboard promoter.

Many direct taxes on billboards have been attempted, and some are constantly imposed. If they can be called "reasonable" in the eye of the average judge, they will hold, but if, as occurs when someone endeavors to attach a tax of five dollars per square foot, they can be termed "confiscatory," they do not hold against the acute and able defense immediately occurring through the national billboard organizations. The right to regulate established by the Massachusetts constitutional amendment is believed to inherently reside in most state constitutions, and thus under the state police power and for the public safety would, it is believed, warrant restriction as to height and extent, as to location, and as well a definite tax per square foot per year or portion thereof, to be made evident by a well-displayed tag or other announcement of minimum size visible to the passing motorist.

Billboards are now required in many instances to be of noninflammable material and to be strongly erected sufficiently above the ground to prevent the commission of nuisance or the hiding of criminals in connection with them. Most of the billboard promoters have abandoned the silly plea that

the billboard hides something dirty or ugly, for it is obvious in increasingly sanitary America that we do not want to hide anything unsanitary or dangerous, but to bring it to light and remove it.

One proposition has been that coupled with the state regulation of billboards visible from any highway be a proviso that if the billboard is faced away from the highway, no tax or regulation is necessary. This somewhat humorous suggestion would at once put upon the billboard men, if it could be enacted, the onus of proving that the value of the billboard was in its view from the public highway, to the building and maintenance of which it had not contributed at all.

"UP TO THE PEOPLE"

After all, James Bryce was completely right when he insisted that in the United States public opinion is the supreme power. Public opinion can restrict, and even abolish, billboards, through influence upon those whose money has kept them in existence and upon those who make laws to restrain them. The important thing, therefore, is for anyone who reads these words and is interested in interfering with the scenic and social fallacy of the bill-

board, to himself act in ways that will be apparent. The advertiser will get off the billboard when he is convinced that it does not pay, and the law-maker will be prompt to tax and restrain when his public demands that action.

It is, as is everything in America, "up to the people." If we do not want billboards we do not need to have billboards. If we are willing that they shall exist in restricted and condensed form in segregated commercial locations, as in my opinion they might, then in such publicly determined locations they can take the position they have in some parts of Europe, and do just as well or better for the advertisers who pay. It is one of the ironies of billboard locations that they are never permitted to exist near the usually palatial homes of the men who have grown wealthy through exploiting them. The "Coca Cola" man has kept them entirely away from a great residential section he has promoted near Atlanta! It is the defenseless poorer citizen who must endure them. In many cities the smaller signs are a clear evidence of civic decay, as the multifarious signs usually found on stables, outhouses and decrepit buildings make plain.

We can reduce the billboard nuisance if we want to. Do we want to?

The Taxicab—Its Service and Regulation

By WILLIAM A. SCHNADER

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IN many respects taxicab service is distinctly different from that furnished by any other class of common carrier.

The most important difference is that taxicabs do not travel over fixed routes or between definite points. For the time being, the person hiring a taxi-

cab dictates where it shall go, and if he desires, by what route. This is a privilege which is not enjoyed by the patron of the steam railway, the electric railway or the bus line. All that the patron of these classes of utility can dictate is where he—the patron—will go.

The taxicab patron can hail a cab on

the street and be driven to the door of his home, his place of business, the theatre or to any other point to which he may desire to go. Indeed, in America, he may telephone for a cab and have it call for him wherever he is, and take him to his exact point of destination. This latter service is a luxury which is not afforded to taxicab users in Europe except in rare instances.

Another distinctive difference between the taxicab and other classes of common carrier is that, generally speaking, the taxicab fare is based upon the mileage traveled by the vehicle regardless of the number of passengers carried. It is true that some taxicab companies charge a basic mileage rate for one passenger and add a nominal charge per capita for additional passengers. This practice has, however, been recently abandoned by the largest companies in Chicago and Philadelphia. It never prevailed in New York. The payment of "extras" is not popular with the public, and the flat mileage rate regardless of the number of passengers will very soon be practically universal. Of course companies imposing an extra charge for additional passengers can afford to charge a lower rate of fare per mile; but the public seem to prefer the higher rate per mile without "extras," rather than the lower rate per mile with "extras."

Another difference between the taxicab and other forms of public conveyance is that in every case the entire cab is hired for the trip, whether the person hiring it be alone or accompanied by one or more persons. Even though the capacity of the cab be five persons, one person may lawfully be its exclusive occupant regardless of the fact that there may be scores of persons waiting for service at the same point at which the one person entered it. Except for traffic delays, the taxicab normally makes "non-stop" trips from the

point of origin to the point of destination.

The differences between the taxicab and other classes of common carrier make it clear that the taxicab is not a competitor of any of them except to a very casual degree. As a matter of fact, instead of competing with the steam railway and the interurban electric or bus line, the taxicab supplements these services. It carries the passenger with his baggage from the railway or interurban station to his home or hotel, and *vice versa*. And the disparity between the taxicab fare and the street railway or city bus fare is so great as to preclude any thought of serious competition between them.

We have already mentioned the fact that in America the taxicab patron may call for a taxicab by telephone and have it come to his door for him—a service which has not hitherto been afforded to taxicab users in Europe. This important development of the American taxicab service accounts in part at least for the higher cost of taxicab service in America.

Few of the patrons of an American taxicab company realize what it means to the taxicab operator to afford a service subject to telephone call, particularly in the larger cities.

To receive telephone orders in a large city, the taxicab company is obliged to have from twenty to fifty telephone trunks running to its private exchange; and to record the orders a correspondingly large number of receiving operators must be on duty day and night. These operators record the name of the patron, the address to which the cab is to be sent, the hour of the order, and, so that the company may call back if a cab is not promptly available, the telephone number of the patron. This record is made on a card which the operator—if the equipment be modern—drops on a moving con-

veyor to be carried to a chief dispatching operator.

To enable telephone orders to be filled promptly, the taxicab company is obliged to maintain, in a city like Philadelphia for example, from seventy-five to one hundred dispatching stands at which its drivers are instructed to stop if disengaged. From the main telephone exchange to each of these stands the company has a private leased telephone wire—the total leased mileage running into very substantial figures.

To transmit to the various dispatching stands orders which can be conveniently filled from them, a series of dispatching operators must be kept on duty continuously at the main telephone exchange. The switchboards at which these operators work are so arranged as to give to each operator the responsibility for dispatching cabs in a distinct part of the city.

Accordingly when the order cards are conveyed from the receiving operator to the chief dispatching operator the latter must assort them, so as to give each order to the operator in whose territory the cab is wanted. This operator then calls the appropriate dispatching stand and transmits the order to the driver who is "first out" at that stand.

To have a cab at the patron's door only a few minutes after the patron gives his order by telephone, requires efficient and attentive service successively by the receiving operator, the chief dispatching operator, the dispatching operator and the driver. During the "peak" hours and on rainy days receiving operators frequently record as many as one hundred orders per hour per operator. To fill these orders with a minimum of error requires management of a type far higher than the uninitiated would imagine.

Telephoned orders, however, constitute only a fraction of the taxicab

company's business, and only a small part of the taxicab operator's problems. A large part of every taxicab operator's business originates at railway stations, hotels, steamship landings, theatres and other points at which large numbers of people congregate. To have sufficient cabs at these various points and at the same time be able to keep the city "covered" so that telephone orders may be filled requires a trained organization which must be on the alert every minute of the day.

As taxicab charges exceed the street railway and bus rates, the public properly expect a higher degree of attention from taxicab drivers than from street railway or bus conductors. To train men not only to be safe drivers but also courteous drivers is another problem which the modern cab company must solve. Indeed the cab company which does not put courteous treatment of patrons on a parity with safe driving is a relic of by-gone days.

This problem the modern company solves by a combination of methods. In the first place, every man must be carefully investigated before he is employed. If his history is satisfactory, he must be schooled both in good driving and in good manners. For this purpose the up-to-date company conducts a regular "school" which every new employe must attend before he can be entrusted with the company's patrons. The course in this school requires attendance for a minimum of from seven to ten days. But not only must a driver be properly schooled—he must have an incentive to practice daily the lessons he has learned. This incentive the leading companies furnish by paying their drivers exclusively on a commission basis, so that self-interest dictates the giving of satisfactory service. Many companies also share their profits each month with their drivers on a definite basis. This

basis takes into account each driver's record for punctuality, continuous service, safe driving and courtesy to patrons. A merit system enables this to be done. The driver who is commended by a patron for unusual courtesy receives a definite number of merits. If he is guilty of a discourtesy, he loses a corresponding number of merits. If he distinguishes himself neither by exceptional courtesy nor by discourtesy his record stands at par unless he has gained or lost merits for other reasons.

Accident prevention is another serious problem of the large city taxicab operator. Due to increased traffic congestion this problem annually requires greater attention. A large taxicab concern must, of course, avail itself of the methods which have been worked out by the various safety organizations which make accident prevention a specialty; but these methods have been found to be entirely inadequate. Indeed taxicab operators have found it necessary to establish their own system of traffic policing. Every large company has a certain number of "street inspectors" who constantly ride the streets in motor cars for the purpose primarily of detecting drivers who exceed the company's speed limit—which is usually lower than the speed limit fixed by law—and other infractions of the company's driving rules. Some companies divide their cities into zones, assigning to each zone one or more inspectors. These inspectors, of course, assist in keeping the company's various stands supplied with cabs and in otherwise regulating the service; but their main duty is to see that the driving is kept safe to a maximum degree. Rigid discipline for the offender against the laws of safety is absolutely essential to support the work of these inspectors.

So far as regulation of taxicab service is concerned, the problem is more com-

plicated than is the regulation of most forms of public utility. Rates, financial ability to compensate for damage to persons or property, stands, the number of taxicabs to be permitted in any city, unfair competitive practices, and the manner of determining the fare are all proper subjects of regulation. Generally speaking, most of these matters have been left to the local authorities to regulate, although in a few states they come within the jurisdiction of the State Public Service Commissions.

So far as we have been able to learn rates have nowhere been actively regulated by a state commission. Practically every city has an ordinance fixing the maximum rates which may be charged for taxicab service; but almost universally the present-day rates are far lower than the maximum established by ordinance. This is due to the fact that nowhere does a taxicab company have a monopoly as is the case with many other forms of public utility. There is, therefore, active competition as to rates with a corresponding tendency to keep the rates down to the minimum at which business can be carried on profitably. In addition, the manufacturers of taxicabs have made remarkable strides forward since most city rate ordinances were passed; and one of the first essentials in the manufacture of a taxicab is the production of a car which can be operated at a minimum cost per mile.

The matter of financial responsibility of taxicab operators is a difficult one to regulate fairly and equitably. This is for the reason that in every city there are many individual operators of taxicabs who own their own cabs and little else. Many of these men formerly drove horse-drawn cabs, and naturally drifted into the taxicab business with the passing of the horse cab. To adopt a scheme of regulation which will properly protect the public in case of dam-

age to person or property by these small operators, and at the same time work out fairly in the case of the large company is extremely difficult. In New York, for example, a state statute requires every taxicab operator to file a bond in the amount of two thousand five hundred dollars per cab to insure the payment of damages due to negligent operation. Obviously a two thousand five hundred dollar bond in the case of the owner of one cab gives the public inadequate protection, while to require a company operating one thousand cabs to furnish a bond in the amount of two and a half millions of dollars is unnecessarily burdensome.

In Pennsylvania, on the other hand, the Public Service Commission exercises jurisdiction to inquire into the financial responsibility of each operator before giving him a Certificate of Public Convenience authorizing him to operate. If the prospective operator is responsible, a bond is unnecessary. If not, insurance or a bond in an amount affording reasonable protection to the public may be required. The Pennsylvania method of regulating this matter is undoubtedly the more desirable from every standpoint.

Stands have almost universally been the subject of local regulation. In some cities ordinances definitely establish taxicab stands at certain places on the public streets, provide how many taxicabs may occupy each stand, and forbid taxicabs while vacant to stand elsewhere. Literal enforcement of these ordinances would render very difficult the filling of telephone orders, as the large company's cabs must necessarily stand on the street in proximity to the company's dispatching stands at which it has telephone connections with the private exchange where orders are received. The result is that these ordinances are always enforced with a certain degree of flexi-

bility. In other cities, the establishment of taxicab stands is left very largely to the police. This method offers less complications to the police in their difficult problem of traffic regulation, as they can move taxicab stands from place to place in harmony with changing plans for avoiding congestion.

The number of taxicabs which may operate in any city is generally unlimited, although some of the larger cities, notably New York, have been obliged to consider municipal legislation fixing a maximum number. In Pennsylvania this subject comes within the jurisdiction of the Public Service Commission. Every prospective taxicab operator must apply for and receive a Certificate of Public Convenience before he can lawfully begin to operate. If there is no public necessity for additional service, the certificate is refused. This, it would seem, is the more intelligent method of regulation.

Unfair trade practices in the taxicab business form an important subject of regulation. Following the example of the largest taxicab company in America—the Yellow Cab Company of Chicago—many companies throughout the country have adopted a distinctive color scheme for their cabs. By consistent advertising they have developed a valuable good will in connection with their respective color schemes. Many unscrupulous individual operators have copied these color schemes thus endeavoring to deceive the public and trade upon their competitors' good will. The courts have in most states protected the public against this form of competition by granting injunctions restraining unfair imitation of this character. This method is, however, unnecessarily cumbersome and expensive. In Pennsylvania the Public Service Commission has taken the position that it will not tolerate practices of this nature, and in a number of

cases has revoked the Certificates of Public Convenience held by offending "imitators." Unfortunately in New York City where this evil is at its worst, there is no jurisdiction short of the courts to protect the public; and the number of simulations is so great that the cost of court action to eliminate the practice is absolutely prohibitive.

The accurate determination of the amount of the fare due at the end of each trip is a matter upon which regulation has been consistently uniform. Whether this matter is regulated by municipal ordinance or by a State Public Service Commission the requirement universally is that taximeters be employed and that they be kept as nearly accurate as possible. The most modern form of taximeter is an instrument constructed very much along the lines of a cash register. It records the mileage traveled by the cab, distinguishing between "pay miles" and "dead miles" and automatically computes the fare due for each trip. At the end of the trip the driver by turning a crank causes the machine to issue a printed fare receipt which he is required to give the passenger. This receipt not only indicates how much the passenger should pay, but enables the company, in the event that the passenger has any complaint or leaves any property in the cab, to identify the driver and the cab.

In addition to the matters which have been mentioned, municipal ordinances frequently require a municipal license for every cab in addition to the state automobile license, and require every driver of a cab to procure a municipal license in addition to the driver's license issued by the state. In the administration of this latter feature a

driver's history is investigated by the municipal authorities before he is licensed and in the event that he is guilty of dishonesty, reckless driving or any other serious offense, the revocation of his license by the city means that he cannot obtain employment as a taxicab driver anywhere in the city. This greatly assists the taxicab operator in maintaining proper discipline so far as safe driving is concerned.

We have frequently referred to certain features of taxicab regulation by the Public Service Commission of Pennsylvania. We have mentioned this Commission particularly because it has gone further in the regulation of the taxicab business than the commission of any other state. The first Public Service Commission to obtain any jurisdiction over the taxicab business was that of the District of Columbia; but a decision of the Supreme Court of the United States construed the Act conferring jurisdiction in such a way as virtually to nullify the ability of the Commission to regulate the industry. In a number of states other than Pennsylvania Public Service Commissions have jurisdiction over taxicab operations, but for one reason or another jurisdiction has not been actively exercised except in Pennsylvania.

It is estimated that taxicabs in the United States carry approximately three and one-half million people per day,—virtually three percent of the population. The taxicab industry has taken its place as an essential factor in the transportation field. As such its proper regulation is entitled to the same careful attention which the regulation of other important public utilities is constantly receiving.

Public Regulation of Motor Bus Service

By DELOS F. WILCOX

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BUS transportation is intimately related to the street railway problem. Since prices went up as an outgrowth of the war, the street railways of the country have been, broadly speaking, in a parlous state. Having been financed for the most part on the basis of monopoly and public necessity, they were in a very poor condition to meet the economic changes effected by the war. Operating costs multiplied, and at the same time the owners were egged on by the example of men in private business and encouraged by the chaotic state of valuation law as developed by the courts, to claim enormous appreciation in the value of their investments, when in fact they were having a very hard time to earn a return, even on the most conservative estimate of original cost.

Street railway material costs have receded considerably from the peak reached during and after the war, but skilled labor still remains at a very high level as compared with pre-war times. Moreover, the cost of construction and reconstruction of street car tracks, as well as the cost of maintenance, is increased by congestion of traffic as the cities grow and motor vehicles multiply.

In the field of operation, power costs are high on account of the high price of coal, of which high freight rates are an important factor, and conducting transportation is expensive on account of the high level of trainmen's wages maintained in recent years. Then, too, regardless of the effects of war, the electric railways have been coming into the period of necessary reconstruction and replacement on a large scale, without having made adequate

provision for depreciation and renewal reserves in the past.

STREET CARS *vs.* AUTOMOBILE

At the same time, the rapid development of the private automobile as a vehicle for business and pleasure has radically changed street railway traffic and operating conditions. Fifteen years ago July and August were peak months for the street cars and summer Sundays and holidays were big days. Now in summer the traffic is far lower than in winter, and every Sunday and every holiday is an off day for street car traffic. For example, the daily average number of revenue passengers carried by the Minneapolis Street Railway in July and August, 1924, was 24.8 per cent below the number carried in the preceding January and February. A study of the monthly load curves on the Twin City Rapid Transit system shows that in 1913 July and August traffic was 4.9 per cent heavier than January and February traffic, but since then there has been a progressive and increasingly disastrous dip in the summer months. In 1923 the Sunday average in Minneapolis was only 260,468 passengers, as compared with 370,939 for Mondays and 425,840 for Saturdays.

Car and passenger counts in Minneapolis taken in July and August, 1924, at seven different points of heavy traffic for both street cars and automobiles, revealed in the aggregate 1,205 street cars and 24,206 passenger automobiles going by. The street cars carried 52,325 people and the automobiles 43,973. It was apparent that the automobiles had seating capacity

sufficient to accommodate all of the traffic carried by both types of vehicles, if the seats could be fully utilized. Of course, the utilization of automobile seats up to 100 per cent is no more feasible than it is to keep the street cars full all of the time. Nevertheless, the figures are significant as an indication of the flexible conditions of urban transportation at the present time. In case of a street car strike, even in a large city, the motor vehicles are already present to enable the mass of the traveling public to make some sort of a shift to get to work and back home again. Great inconvenience still results from the cessation of street car operation, and the public insists on getting the street cars back again, as witness the experiences of Toledo, Des Moines, Bridgeport, Akron and the cities of New Jersey; but riots, bloodshed and business paralysis are no longer inevitable.

The aggregate amount of passenger service rendered by the electric railways of the country remains substantially undiminished; the total street railway traffic represents ten or twelve times as many revenue rides as the passenger traffic on all the steam roads of the country; and the passenger revenues collected by the street and interurban railways come close to a billion dollars a year. Even on Manhattan Island, notwithstanding the congestion of vehicular and pedestrian traffic, and notwithstanding the multiplication of underground and overhead rapid transit facilities in Greater New York, the surface street car lines, long regarded as decadent, still carried 376,595,381 fare passengers in 1923, which is only slightly less than the maximum they ever carried in a single year.

Experience everywhere in the United States up to the present time indicates that private automobiles and competitive jitney and motor bus transporta-

tion can do the street railways an immense amount of harm, but that in the larger cities at any rate they cannot now supplant electric railway service as a convenient and necessary public utility. Thus we have a condition arisen which calls for a radical readjustment or expansion of public regulation in the field of urban and interurban passenger transportation. If street railway rates are to be regulated by public authority, if the standards of street car service are to be maintained, if extensions of service are to be required, if rehabilitation of worn out car lines is to be insisted on, if special taxes, and public obligations, calling for the expenditure of large sums of money, are still to be imposed on the street railways, the public necessarily must undertake to regulate and limit the direct competition to which the street railways are subjected by other instrumentalities of mass transportation.

HOW FAR CAN PUBLIC INTEREST IN STREET RAILWAYS GO?

Monopoly is a matter of degree. It would be hard to find a complete monopoly in service or commodities that are absolutely essential to human life. In almost every case, some other commodity or service can be substituted at greater or less inconvenience and with greater or less actual loss. But in the field of urban transportation, motor bus service is so eligible an alternative to street car service for such a vast multitude of individual riders, that the elements of monopoly, usually conceived as offering the basis for public regulation of rates and service, are well-nigh destroyed, so far as the street railway is concerned.

What is to be done? Shall the public withdraw from the street railways the heavy hand of regulation, and release them from their responsibilities as a

public utility, leaving them free to render service where it is profitable and to compete on their own terms with other means of transportation? Is it conceivable that these instrumentalities of public service, operating under public franchises and using the public streets as rights of way for fixed and permanent tracks and overhead construction, should now be relegated to the status of a private business and be let to go their own sweet way? The answer to this question depends upon what we conceive to be the nature of the street railway in relation to community needs. If we regard it as an essential instrumentality of public service, it must be protected as well as controlled. On the other hand, if it is a mere obsolescent private enterprise, in whose stability and continued expansion the public has no vital interest, then gradually its privileges may be withdrawn, its obligations lightened, and its ultimate fate be left to the verdict of time and the arts.

The public is not interested in the protection of the street railway merely as a private financial enterprise. Its interest, if it has an interest, is in the protection of the street railway as a tool or instrumentality of public service, something which belongs to the public and cannot be taken away or injured without injury to the public. Obviously, the public under our form of government cannot well undertake to prohibit the use of private vehicles or to arrest people for walking and bundle them into the street cars to pay fares for the support of the street railway as a private business.

But if the continuance of the street railway is a public necessity, the public can levy taxes to support it and can limit or prohibit the direct competition of other public vehicles. Even if the public asserts its interest in the main-

tenance of street railway service to the extent of public ownership and operation, as it has already done in a number of American cities, still, practical considerations make it necessary that the street railway service rendered under public auspices shall be self-sustaining or as nearly so as possible under the circumstances in each particular case. Special burdens may be withdrawn, service may be reduced in certain instances, fares may be increased within certain limits, operating economies may be effected, even special taxes may be levied to cover the cost of stand-by service which benefits the community as a whole, but in the main the public is not interested in empty cars but in full ones; it must figure on keeping the street railway in condition to render a maximum amount of public service and to offer this service under conditions that will attract those who can make use of it.

Without doubt, the movement toward public ownership, from the point of view of public policy, is being slowed down by the doubt in the public mind as to the future of the street railway, and even by the conviction on the part of many people that the street railway is obsolete or obsolescent and has no future, unless it be as a business artificially bolstered up and kept going beyond its time. Notwithstanding the superficially confused outlook, the evidence is overwhelming that the street railway as a public utility is neither dead nor moribund, but that its financial difficulties are such as to make public co-operation and support necessary. This naturally points toward public ownership and operation, but in any event complete municipalization will take a long time, and either under public ownership or under continued private ownership, the problem of the control of competition remains.

REGULATING MOTOR BUS TRANSPORTATION

The motor bus as a public carrier, whether operated singly or as part of an organized system of transportation, naturally falls within that class of enterprises in which the public has a special interest and over which it is bound to exercise special control. In other words, the motor bus is a public utility, and is due in its own right for regulation. The status of the street railway in relation to actual or potential motor bus competition merely complicates the problem; so that we have two questions to answer instead of one:

First, what regulations should be imposed on motor bus transportation for the protection of those who ride in the buses or who meet them on the road, and for the protection of the taxpayers who furnish the road?

Second, what further or different regulations should be imposed on the motor buses for the protection of those who use the street cars and for the protection of the public's interest in the street car as an essential utility?

The regulation that motor bus transportation, in and of itself, requires at the present time is comparatively simple. The motor bus does not fasten itself to public property and claim to use public streets as a private right of way. It can move from one route to another or even transfer its operations to another town, or cease operation altogether, without the destruction of a vast amount of fixed property devoted to public use but vested in private ownership. Public regulation is comparatively unimportant so far as the protection of the investment is concerned, and not yet of very vital importance as a curb on privileged monopoly. In those localities where the motor bus does enjoy a monopoly

of public transportation, it should as a matter of course be required to render adequate service and to charge only reasonable rates, but in most cases both these objects are still regulated by direct or indirect, potential or actual, competition.

In New York the Fifth Avenue Coach Company has operated for many years under a ten-cent fare franchise, chiefly on Fifth Avenue and Riverside Drive, where street cars have always been taboo. The traffic is largely a sight-seeing traffic which does not mind the ten-cent fare, or a Fifth Avenue shopping traffic that chooses this route in order to get to high-priced stores. The Fifth Avenue Coach Company competes successfully with surface, subway and elevated lines parallel to its route and only one or two blocks away. That it has been successful as a financial enterprise is shown by its balance sheet for December 31, 1923, as published by the Transit Commission. The item of "fixed capital" or "gross investment" appears at \$3,983,391.14, with accrued amortization of \$1,301,018.50, leaving the "net investment" in utility property at \$2,682,372.64. Its "other investments," "current assets," "material and supplies," etc., bring its total assets up to \$6,905,485.74. On the liabilities side it has no bonds and only \$50,000 of capital stock, but a corporate surplus of \$6,062,960.93. It carries about 55,000,000 revenue passengers per annum, which is within 10 per cent of the total street railway traffic in Denver, where there are no local buses.

In Detroit and Chicago, the motor bus companies are carrying a vast amount of traffic at the ten-cent fare, for the most part being routed on streets where there are no street car tracks, and rendering a special service for which, apparently, their clientele

are quite willing to pay ten cents, as contrasted with the general six-cent street car fare in Detroit and the seven-cent fare in Chicago.

In Minneapolis and St. Paul there are no strictly local buses, but intercity bus lines have sprung up in recent years, substantially paralleling on the same streets three of the through-service street car lines. The street cars charge two fares, twelve cents in all, for the intercity ride. The buses charge twenty-five cents, whether the passengers take a through ride or go only a few blocks. Yet the buses thrive, and during the summer of 1924 the Twin City Rapid Transit Company acquired the principal one of these bus lines at the announced price of \$500,000. The buses are now being operated through a subsidiary company, and thus far (September 29) they continue to charge the same rates as formerly, with no noticeable change in either street railway or bus service.

On the other hand, the development of competitive, low-priced jitney bus service in Newark and the other principal cities of New Jersey during the past eight years has been so remarkable that the Public Service Railway has been forced to adopt a five-cent zone fare on its street car lines, and is now getting possession of the jitney lines and operating its own fleets of buses at the old jitney rates. In New Jersey, the development of the jitneys was in part due to the inability of the Public Service Railway to render adequate service with its present track layout, particularly in connection with the Newark terminal of the Hudson and Manhattan Railroad, where an immense traffic demands convenient accommodation; but in the main the jitney service has been competing more or less directly with the street car service.

From a consideration of facts such

as have been cited, it seems obvious that the regulation of buses, where they do not compete with the street railways, should cover such matters as routing, schedules, speed, responsibility for accidents, type of vehicle, noise, ventilation, lighting and other similar matters which are essential elements of public transportation service. Also, in order to protect the tax-paying public from too heavy burdens, it may be necessary to levy upon the buses license, gross earnings or other taxes sufficient to constitute their fair proportion of the cost of the roads which they use and the police service which high speed vehicles and congested traffic make necessary.

EXTENT OF MOTOR BUS REGULATION

When it comes to the other question, namely, the extent to which motor transportation should be limited and regulated for the protection of the street railway as an essential instrument of public service, there are more difficulties. It all depends on whether or not the street railway broncho has in fact been subdued to domesticity and the patient drudgery of obedience. The American people cannot afford to check competitive enterprise in transportation save for *public* benefit, and protecting and preserving the street railway by restrictive measures are quite unwarranted, unless the street railway is in fact, as well as in name, a public service agency. It cannot well have its monopoly bolstered up by public regulation, until it has cast out the evil spirit of exploitation, purged itself of all extravagances and settled down to an honest, quiet and responsive career of service. To put it in another way, the public does not owe the street railways protection so long as they persist in trying to bolster up unsound and speculative financial structures, with the vagaries of repro-

duction cost and other vain imaginings of the subsidized expert mind. With the street railway eschewing speculation and basing their claims to public favor upon the solid rock of honest and prudent investment in public service, they will be entitled to protection from unfair competition. In many instances, however, the street railways put forward valuation and rate-of-return claims which, if admitted, would put street car fares and service clearly beyond the pale of public regulation; for the companies could not give bad enough service or collect high enough fares to yield anything like the cost of capital which they claim as their due.

In general, upon the assumption of actual public control, either through public ownership or through effective public regulation, if that is possible, the main agencies of local passenger transportation should be closely co-ordinated and made to co-operate in rendering comprehensive, convenient and economical public service, with only a little competition left on the fringes of the transportation area for pioneering purposes.

The kind of bus regulation required to protect the street railway obviously includes:

1. Control of bus routes, so as to make bus service supplementary rather than directly competitive.
2. Adequate taxation to put buses on a par with street cars.
3. Heavy bonding or other measures to enforce liability for injuries and damages inflicted as an incident of bus operation.
4. Regularity of schedules and adequacy of service.

Obviously, also, it is unnecessary,

from the street railway point of view, for the public authorities to insist upon the buses reducing their rates to a parity with street car fares, where the buses attract traffic at the higher rates, and, on the other hand, the public authorities can hardly be expected to insist on the buses *raising* their rates to the level of the street car fares, where the latter are higher, if the buses are in fact able to render service at the lower rates after bearing their share of the public burdens. Indeed, the extent of bus regulation necessary to protect the street railways will depend largely upon its form. If the street railways are effectively protected from bus competition for traffic tributary to the car lines, they have no further legitimate interest in bus regulation, except as they share in the general interest of the community. On the other hand, if it is impracticable, as it is likely to be in most cases, to shut off bus competition entirely, then the street railways are interested in a type of public regulation that will not leave the buses with unfair advantages in the laxity of service requirements or in the lightness of the public burdens imposed upon them.

Under private ownership and operation, the competition of bus transportation should be controlled and kept within reasonable bounds, but not stifled.

Under public ownership and operation, buses should be utilized for supplementary service, with opportunity for free experimentation and the partial or complete substitution of bus transportation for the street cars if, where, and when this substitution can be effected with advantage to the public, due consideration being given to the capital losses involved in the change.

The Highway Business What Pennsylvania is Doing

By WILLIAM H. CONNELL

Engineering Executive and Deputy Secretary of Highways, Commonwealth of Pennsylvania

IN the United States there are about seven hundred fifty thousand (750,000) people engaged in highway work, the expenditures for which amount to about one billion five hundred million dollars (\$1,500,000,000) a year.

The highway business is one of the largest—if not the largest—business industries in this country today. The reason, of course, is that it supplies a need that is an important factor in the life of every individual in the country. Highway transportation is a necessity from an educational, religious, economic and social standpoint in the farming districts, on the plains, in the mountainous districts, as well as in the large centers of population. The advent of motor transportation with its far-reaching possibilities for the individual, both from a business and social standpoint, has created a demand for improved highways in every section of the country.

In the days of horse-drawn traffic paved highways were, as a rule, to be found only in centers of population and suburban sections. The economic limits of horse-drawn transportation were confined to a very small area and, therefore, it was not necessary to construct high class pavements for any great distance from the large centers of population. The advent of motor transportation has increased the radius of highway transportation so that it has become necessary, in order to meet the traffic needs, to construct modern highway type pavements throughout every section of the United States.

This complete change in traffic conditions within the last twelve years is responsible for the growth of the highway industry. The highway business like the steam railroad business, the steel business, the newspaper business, the manufacturing business, or the street railway business, is a business that can only be successfully conducted by applying everyday, common-sense, business principles to its operation.

Trained Engineers to Solve the Problem

The problem, so far as state highways are concerned, is comparatively new, as it was of little consequence before the advent of the automobile. This new means of transportation played havoc with the old waterbound macadam pavement and made it necessary to make changes in the wearing surface of this pavement and to provide more substantial construction for country roads. The solution of this problem was worked out like the solution of every problem is worked out, but in this instance under great difficulties. The proper procedure, when confronted with a problem, is to make a general study of the conditions and determine upon the best means of ascertaining the necessary facts to solve the problem.

If an individual is in poor health and does not know what the trouble is, a doctor is called in because he is trained and equipped to solve the health problem. If the difficulties are of a legal nature the lawyer is called in to solve the problem. If there are difficulties encountered in railroad business the

solution of the problem is to get the advice of railroad men. In the newspaper business newspaper men are called upon, in the manufacturing, business men who understand that business, and likewise in the highway business, men who understand the highway business, or highway engineers, are the ones to solve the problem.

Unfortunately, a number of years ago, due to the work being largely public work, everybody thought he knew as much about it as the men who were trained in the business and everybody "butted in." The butcher, the baker, and the candlestick maker and well-meaning citizens of all classes conducted highway work and wasted untold millions of dollars in attempting to solve a problem that they were not trained to solve and knew nothing about. If this work were entirely controlled by business interests, it would have been solved in the usual way: by employing those best fitted to work out the solution. This condition, which retarded highway improvement for a number of years, is gradually giving way to a realization by the public of the necessity of entrusting the highway engineering business with trained highway engineers, as they appreciate that in the last analysis it is the only solution and the success of any business is dependent upon its being conducted by a force trained and schooled in the business they are conducting.

Placing Work on Engineering Business Basis

Great strides have been made in the last fifteen years in placing highway work on a highway engineering business basis and the Pennsylvania Department of Highways is an outstanding example. The solution of any problem is comparatively easy when there is a thorough understanding of the

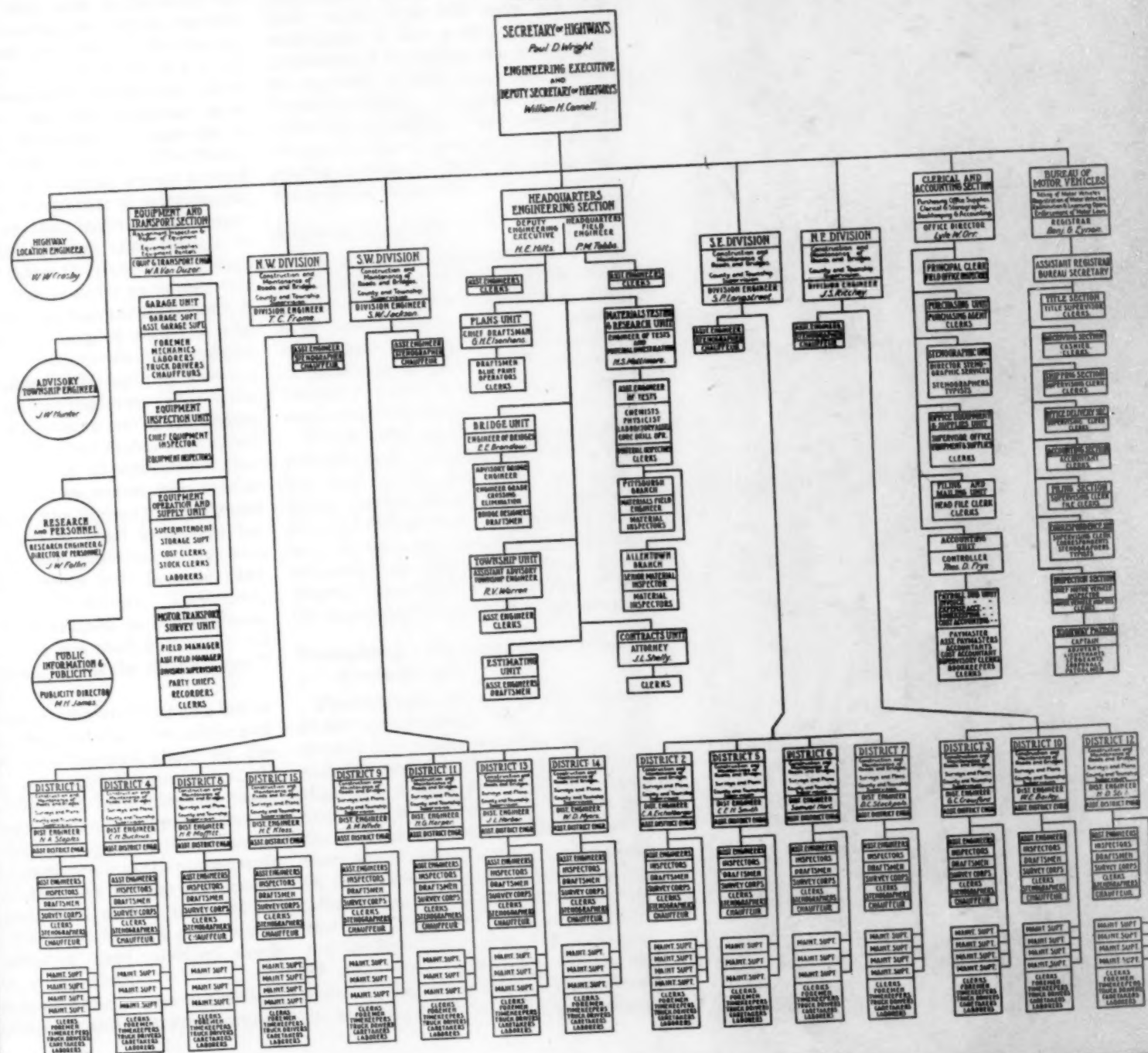
problem by all interests concerned. To bring about a thorough understanding there is nothing like getting all the facts and putting the cards on the table. The highway business has been mismanaged, misunderstood and confused in many instances in the past, due to a lack of understanding. The American public would not deliberately throw untold millions into the gutter, as they have done in highway expenditures in the past, and as they are doing in many instances today, if there were a better understanding of the facts. The only way to get highway facts is through trained highway engineers.

This is the situation which the Pennsylvania Department of Highways is bringing about. The state has organized a department of trained highway engineers whose services are not only confined to the conduct of the work of the state highway system, but the state is offering the services of this technically trained, highway organization to all the counties and townships. The legislature has enacted laws that enable the counties and townships to avail themselves of the services of this organization so they can be properly guided in their highway expenditures and the counties and townships have been quick to take advantage of this opportunity and are co-operating with the Department in a manner that is most gratifying.

Politics and Material Interests Propaganda

In the old days everybody used to tell the engineers how to build highways and where to build them. Now, in most instances, in Pennsylvania they are asking for advice. This condition is gradually being brought about throughout the whole United States. The approach to the solution of the highway problem has always been very

JUNE 1, 1924.



simple but it has taken years to focus it, as the issue was deliberately beclouded by contractors, selfish, material interests and politicians. In the old days many contractors did not want highway engineers inspecting their work. The material interests were conducting misleading propaganda to push their own materials. Politicians were throwing a smoke screen around the issue, in the nature of propaganda, to the effect that technical men were not practical enough and, strange to say, it has taken the public a long time to realize that in order to handle this problem from a practical standpoint it is necessary to employ someone who thoroughly understands the problem and, of course, in the highway business it is the highway engineer. One of the leading politicians in one of the largest cities in the United States only a few years ago said, in all seriousness, that he believed the inspectors who were at that time in the highway department referred to were good inspectors because they were practical fellows and knew the streets well because they used to be truck drivers. To inspect, one must be trained in the business. The inspector is a most important cog in the wheel. He is the chief's "eyes" on the job.

These days are giving way to a better understanding between the public and the engineers, brought about by the highway users and the engineers. If propaganda had been directed years ago to install a trained organization to handle highway work with as much force and persistence as the propaganda that was directed by the politicians, contractors, and selfish, material interests, there would be a great many more miles of hard surfaced roads available at this time.

There is only one answer to the highway problem: install a trained organi-

zation. Through their knowledge of the subject, which will be reflected in their work, they will soon get the confidence of the public. With the confidence of the public, the money will be supplied in bond issue and motor license revenues. Everyone is directly or indirectly a highway user and is glad to pay his share provided he sees he is getting a dollar's worth of value for every dollar expended.

Highway Expenditures

The proper administration of the expenditures of one billion five hundred million dollars (\$1,500,000,000) a year is of paramount importance. Waste and extravagance in the administration of these expenditures could very easily bankrupt states, counties, cities, boroughs and townships.

Of the total expenditures, about 75 per cent is for rural highway work, 25 per cent for the streets and roads of urban communities having a population of 2,500 or more. The state highway departments are the largest units administering highway work and the Pennsylvania Highway Department is the largest state highway organization.

Pennsylvania Highway System and Administration

Pennsylvania has an area of about 45,000 square miles. The state area is divided into cities, counties, boroughs and townships. The Department of Highways exercises a general control over all the highway work outside of the cities and boroughs. In this area there are about 100,000 miles of road. Of this amount 10,307 miles constitute what is known as the state highway system. Those roads are entirely under the jurisdiction of the Department of Highways. Approximately 5,780 miles are improved with a hard surface in some form or other. That means

either stone or durable types of pavements. The remaining 4,527 miles are unimproved dirt roads that are to be paved by the Department of Highways. The system is divided into a primary and secondary system. The primary system comprises about 3,970 miles and these roads constitute the main trunk line highways. They connect county seats and large centers of population and the adjoining state highway routes.

Expenditures

From 1911 to 1923 \$180,000,000 was spent on the state highway system, of which \$112,000,000 was spent on construction, \$50,000,000 on maintenance, and \$18,000,000 on miscellaneous work, overhead and various other items.

The great stride in highway work in Pennsylvania was made between 1919 and 1923, or after the war. During that period \$135,000,000 out of a total of \$180,000,000 was spent on the system. Prior to 1919 there was not much progress.

The estimated expenditures from January 1, 1923, to January 1, 1927, directly under the jurisdiction of the Department of Highways will be about \$220,000,000. Twenty million dollars of this is one hundred per cent county work—work for which all the cost is contributed by the county and the engineering and inspection is done by the State Department.

The township work is also a very big factor as will be appreciated from the great mileage of roads. It is estimated that in four years there will be \$85,000,000 spent on the township roads. This work is under the general supervision of the Department of Highways but is not as closely controlled as the one hundred per cent county road work. Adding this expenditure to the \$220,-

000,000, it shows a total expenditure of \$305,000,000 which will be under the general supervision of the Department of Highways during the four years of this administration. This is probably a greater sum than has been spent on any engineering project, such as the Panama Canal or the New York Water Works, in the same period of time.

This emphasizes the magnitude of the highway work throughout the country. It is the big thing in engineering today and it will continue to be for a great many years to come and probably for all time, or until there is an entirely different system of transportation. As long as transportation remains on the ground the highway problem will be increasing from year to year. The upkeep is the big problem and the more roads that are built, the greater will become the upkeep problem.

Organization

In carrying on work of such magnitude, organization is a very important factor and the greater the magnitude of the work, the more necessary it is to have a good, sound organization. When the problem consists of controlling the work in a small area, it is a very simple matter, but the control of work in a large area, where the work is necessarily widely separated, becomes largely a matter of organization.

The general engineering organization of the Pennsylvania Department of Highways, including the clerical, stenographic, etc., consists of about one thousand seven hundred people. The maintenance field organization, including foremen, laborers, etc., at the height of the working season consists of approximately 12,000 men. In addition to this the contractors employ about 12,000 men on state highway construc-

tion and, of course, this work is under the supervision of the department. So there are about 25,700 people engaged in highway work under the supervision of the Pennsylvania Department of Highways from April until December and there is, of course, a very considerable force engaged on maintenance work all through the winter.

In the present organization of the Department of Highways the secretary of highways is the head of the department. The engineering executive and deputy secretary is next in authority and has been delegated all the powers of the secretary of highways. Reporting to the engineering executive is a deputy engineering executive who is primarily in charge of the office engineering routine. There is also a headquarters field engineer, equipment transport engineer, location engineer, research engineer, supervisory township engineer, office director, director of the bureau of registration of motor vehicles, and director of publicity, reporting direct to the engineering executive. There are also four division engineers whose offices are located at different points throughout the state who report to the engineering executive. There are fifteen district engineers with offices located throughout the state. These men report to the respective division engineers in charge of the territory in which they are located. There are fifty-two superintendents of maintenance reporting to the respective district engineer in charge of the territory in which they are located. The district engineer is king in his territory. His word is law. He makes the surveys and plans which are sent to the main office where they are given further study, after which the type of pavement is selected and the work advertised from the main office. The inspectors and the survey corps, as well

as the maintenance superintendents, report directly to the district engineer. The idea is to keep the division engineers free from detail so they can spend all their time going around the state advising with the district engineers in connection with the construction and maintenance work. All routine correspondence comes direct from the district to the main office and copies are sent to the division engineers.

Motor Vehicle Registration

The registration of motor vehicles and the collection of license fees is under the direction of the Motor Vehicle Registration Bureau of the Department of Highways.

Comparative Unit Costs

As a means of developing the maintenance work and placing it on a higher standard, it is being placed on a comparative unit cost basis. The first thing to know is the comparative unit costs of work under the jurisdiction of the division engineers. The division engineers then in turn hold the district engineers responsible so that the cost of the work under the jurisdiction of the district engineers is compared. The district engineers in turn hold their superintendents responsible so that it is necessary to have comparative costs of the work under the jurisdiction of the superintendents. The superintendents hold their foremen and caretakers responsible, which makes it necessary to have comparative costs of the work under the jurisdiction of the respective foremen.

This system invariably increases production at a decreased cost. It arouses the interest of the men in their work and raises the standard of morale of the organization. When the men feel that there is a definite basis for comparing the quantity and cost of

their work with work in other localities, they naturally become more interested as the competition brings about a spirit of friendly rivalry. It results in developing a better and more effective organization as it gives the men something more to think about than the mere performance of the physical work. It translates the work into dollars and that naturally gives them an added interest. It tends to encourage them to think about their work from the dollar and cents standpoint as well as from a quality and quantity standpoint and, of course, the main thing in a large organization, in order to get the best results, is to develop ways and means of interesting the men in their work.

The two outstanding phases of the highway business are upkeep and construction. Upkeep is of the most importance because poor upkeep necessitates premature new construction. The application of the theory, "A stitch in time saves nine," to the upkeep of the highway system saves untold millions in new construction. The upkeep is the operating side of the business and any experienced business man knows that it is poor economy to neglect the upkeep of the buildings, machinery, etc. He also knows that when the annual expenditures for upkeep exceed the interest, sinking fund and upkeep charges of the replacement, that the economic limit has been reached and replacement is justified. This is the theory that the Pennsylvania Department of Highways is applying. The department is guided in its maintenance and building of new roads by plain, ordinary, everyday economics.

Location of Highways

While the economics of the road surfacing is a very important factor, the economics of the highway location is

also of very considerable importance. The highways, like the railroads, lead from one center of population to another. The through routes in particular should be located with a view to carrying the traffic to and from the different centers of population by the shortest route and over roads with reasonable grades and curvature for motor transportation. Most of the roads were laid out for local horse-drawn traffic without much consideration being given to selecting the shortest route between distant points. The old highways, therefore, are not as a rule on the economic location.

In general in Pennsylvania the location of the state highways is fixed by legislative enactments which enumerate the principal points connected by the routes. Between these points the department has wide powers of relocation and uses these to establish locations which will best serve the greatest number, the general principle being kept in mind that the state highway routes are essentially through routes.

It is not necessary to continue to adhere to a location of a route through a point fixed by legislature if it is not the logical location for a through route, provided a spur is built by the state from the route to the point fixed by legislature. It will be readily observed that this enables the department to locate the through routes to the best advantage to the state as a whole by eliminating minor centers of population in instances where it would increase the distance considerably to pass through these communities. The policy of relocating through-route highways with a view to providing the logical shortest route sometimes leads to a sacrifice of local interests for the general good.

The average motor transportation cost to the highway users for each

thousand feet over a hard surfaced road is approximately \$.023 for each vehicle. The cost, therefore, of one thousand vehicles a day would be \$23.00, or \$8,395.00 per year, or approximately \$167,900 over a period of twenty years. This clearly indicates the necessity of shortening the distance, where practical, on a through-route highway. Many relocations are made that result in shortening the distance over a mile. Based on the figures stated, the saving to the users in transportation costs for each mile would be approximately \$44,300 per year, or \$886,000 over a period of twenty years. These figures are based on 90 per cent passenger traffic and 10 per cent truck traffic.

On the Pennsylvania state highway system the relocations thus far have resulted in a saving of approximately 100 miles. With an average traffic of 1000 vehicles per day the saving in operating costs is approximately \$4,430,000 per year. To this should be added \$480,000 which is the average annual costs of 100 miles of pavement and is made up of the interest on the investment, sinking fund requirements for bond issue, and the maintenance costs, making a total annual saving, due to reducing the distance by 100 miles on the Pennsylvania highway system, of \$4,910,000 per year. In other words, if this distance were not saved by constructing the highways on the economic location, the waste or loss to the public would be \$4,910,000 per year.

It is difficult for local communities to reconcile themselves to the highway being routed around their community instead of through the main street, but when they are built for through traffic, the only sound policy is to build them in the most economic location for all the users.

Ultimate Width of Right of Way

The maximum traffic on the hard surfaced roads on the Pennsylvania highway system is as high as 15,000 vehicles a day on roads close to the city of Philadelphia, while the maximum traffic on some of the out-lying, hard-surfaced roads is less than 100 vehicles a day, and of course it is considerably less than this on unimproved roads. It will be readily observed, therefore, that there is quite a diversity in traffic conditions in the different sections of the state.

Pennsylvania has a number of large centers of population, notably Philadelphia, Pittsburgh, Wilkes-Barre, Scranton, Erie, etc., and also a very extended area in which the population averages only about 50 per square mile. Of course, there is a very considerable area where it does not average one per square mile. The highway system traverses a territory embracing virtually all kinds of traffic conditions. A very considerable mileage of the roads on the system are mountain roads, where the problem is to provide safe roads with relation to grades and curves without detracting too much from the natural scenic advantages.

The state highways, like the city streets, due to the variation in their importance from a traffic standpoint, should be constructed of varying widths, and provision should be made for the future traffic requirements by fixing the ultimate width of right-of-way. During the present administration the Pennsylvania Department of Highways made it a policy to fix the ultimate width of right-of-way for the highways on the state system. The law gives the department the authority, with the approval of the governor, to fix the width of the ultimate right-of-way up to 120 feet. By recording such

action with the proper county court the width adopted becomes the legal right-of-way. This will save the public millions of dollars in damages when the highways are widened, as once the width is established and recorded, damages cannot be collected for improvements constructed within the established right-of-way. The law provides that the cost of damages for the abutting property for additional right-of-way is to be borne by the counties.

At the present time surveys are being made with a view toward fixing the ultimate future width and right-of-way for all the highways on the highway system. The widths that will be established are 50, 60, 80, 100 and 120 feet. This includes the sidewalk area. The determination of the width of the highways in each instance is based upon the probable future traffic needs. In open country, where there is no curb and no occasion for parking on the pavement and where there is sufficient traffic to warrant it, provision should be made for future pavement widths that would provide for a slow and a fast moving traffic lane going in either direction. This would necessitate a paved width of roadway of forty feet, leaving ten feet for sidewalk space for pedestrians. On highways carrying very heavy traffic the width is based upon three ten-foot traffic lanes in either direction, making six in all. The traffic lane nearest the curb is for parking, the lane next to that for slow moving vehicles, motor busses, trucks, etc., and the other lane for fast moving vehicles and for passing.

This work will result in fixing the state plan. This is similar to what has been done by cities in the past and it has been considered of such importance in large cities that city planning engineers are engaged exclusively on this work. It is equally important, if not

more so, in state highway systems. A location engineer has recently been added to the staff of the Pennsylvania Department of Highways to take charge of this most important function. Several plans have already been filed and a number of surveys are under way. This is the kind of work the engineers will not receive much credit for during their lifetime, as the need for the additional widths of right-of-way that are being established at this time will not materialize for a number of years. It is for future generations, but now is the time to do it. Highway departments, like railroads, public service corporations, and industries, must have sufficient vision to provide for the future needs, otherwise the work of today will not fit in with the requirements of tomorrow.

Economics of Selection of Type of Construction

The type of construction is determined upon after reviewing all the facts relative to the probable future traffic needs of each individual section of highway as it comes up for consideration. It would be absurd to construct a pavement with a light traffic surfacing on a heavy traffic highway, and likewise it would be absurd to construct a pavement with a heavy traffic surfacing on a highway where the facts indicate that the future traffic will be very light.

There is no such thing as one design of surfacing to suit all conditions. This would be false from a business engineering economic standpoint. In each instance the facts relative to the probable future traffic needs of the highway should be used as a guide in the selection of the type. It would be false economy to construct a type of surfacing that is suited only for light traffic on all of the roads. It would likewise be false economy to construct

a type of surfacing that is suited for heavy traffic on all of the roads.

The economic road surfacing may consist of any type of surfacing from a dirt road to a high-priced, smooth, dressed, granite block pavement on a concrete foundation. The economic surfacing is the surfacing that adequately provides for the traffic in each individual instance at the least annual cost. The items that enter into the costs include interest on the investment and, if constructed from bond issue, the sinking fund charges for the retirement of the bond issue, the annual cost for the upkeep of the road, transportation costs, or the difference in the cost of operating motor vehicles on different types of road surface.

The transportation costs vary depending upon the character of road surfacing. For example, it is generally accepted from tests that have been made throughout the country, notably those by Professor Agg of the Iowa State College, that it costs about 40 per cent more for the fuel to operate a motor vehicle on dirt roads than on smooth, hard-surfaced roads. The items of motor vehicle transportation costs which are affected by the character of the road surfaces include depreciation, repairs, tires, oil and gasoline. It is estimated that the total additional transportation costs for motor vehicles operated on dirt roads as compared with hard surfaced roads is 25 per cent. From this it can be readily seen that, where there is any appreciable amount of traffic using a dirt road, the saving in the operating costs for these vehicles on hard-surfaced roads as compared with dirt roads would justify the construction of a hard-surfaced road. For example, assuming that the average operating cost per mile of passenger cars on hard-surfaced roads is ten cents, and the average operating

costs of trucks on hard-surfaced roads is thirty-six cents, assuming traffic of 300 vehicles a day, 90 per cent passenger cars and 10 per cent trucks, and operating costs on dirt roads 25 per cent more than on hard-surfaced roads, the annual saving in operating costs per mile per year would be \$2,835 per mile, using 300 traffic days per year, or more than enough to pay for the annual interest, sinking fund and maintenance costs for the construction of a hard-surfaced pavement suitable for the traffic.

For a traffic of 600 vehicles per day divided in the same proportions, the operating savings per mile would be approximately \$5,670 annually and for a traffic of 1,000 vehicles per day the savings would be \$9,450 annually by changing from a dirt to hard-surfaced pavement.

A dirt road is not an adequate road surfacing for any appreciable amount of traffic and under such circumstances it cannot be satisfactorily maintained at any cost. On the other hand, there are many instances where there is not sufficient traffic to warrant the construction of a pavement. The economic road surfacing in some instances, therefore, is the dirt road, in other instances a gravel road, in others a bituminous, surface-treated macadam road, a bituminous, penetration macadam road, a bituminous concrete road on a stone base, a bituminous concrete or asphalt pavement on a concrete base, a concrete pavement, a granite block pavement on a concrete base, etc. In each instance the determining factor should be the facts relative to the estimated probable future traffic the road will be required to care for. These facts govern the selection of the type of pavement and the width of the roadway. We can closely estimate from experience the annual mainte-

nance costs on a vehicle ton mile basis for the different types of pavements. From this it will be readily seen that it is not a difficult matter to determine the economic pavement or the pavement that will be adequate for the traffic needs in each individual instance.

Traffic Studies

The primary consideration must always be the probable future traffic and the character of this traffic. Present traffic information is helpful but often misleading. For example, a road that is not substantially paved may carry a considerable amount of passenger traffic, whereas if it were paved with a so-called durable type of construction, it would probably invite a very considerable amount of heavy truck traffic. It is for this reason and due to many other considerations entering into the problem, upon which the conclusions are based with respect to the estimated future traffic and character of the traffic, that it is necessary for all highway departments to make studies, with a view to forecasting the probable future traffic needs, such as are being made by the Pennsylvania State Department of Highways today, in co-operation with the United States Bureau of Public Roads. The studies being made will take into account whether the probable future development of the territory tributary to the respective highways will be agricultural, mining, industrial, resort, etc.

Construction based on estimated future traffic information, such as is being developed from studies being made in this state, is far better than selections which are based on a construction of uniform strength for all traffic conditions throughout the state. It is perfectly obvious that this method of determining the suitability of construction will result in having a great

percentage of construction entirely too light for the probable future heavy traffic roads and pavements unnecessarily costly for the probable future light traffic roads.

The traffic studies being made by the Pennsylvania Department of Highways and the United States Bureau of Public Roads are very extensive and far reaching and will supply the facts upon which to determine the ultimate widths of right-of-way of the roads on the highway system as well as the character and widths of pavements. The government regards this survey of sufficient importance to pay one-half the cost in order to obtain the necessary information for future highway planning. The survey was started last October and will be completed this October. The force consists of about one hundred men located at different points throughout the state making traffic counts, weighing trucks, getting information concerning the kind of goods transported, origin and destination of trucks and passenger cars, and all necessary data relative to the subject, all with a view to estimating the amount and character of the probable future traffic use of the highways. This in itself is a very big subject and would require a great deal of space to discuss it in all of its aspects. It will be sufficient for the purpose of this discussion to state that the studies being made are similar to those made by railroads, street railways, telephone, and other public service corporations and industries in general in order to estimate their future business so they can make their plans accordingly. The highway business is highway transportation and it is essential to obtain all the necessary information to plan to the best advantage to take care of the future transportation needs.

After the highways are constructed

the biggest problem presents itself which is the problem of the operation of the highway system. This involves the upkeep and control of the use of the highways.

Upkeep

The 13,700 men on the payroll of the department, of whom about 12,000 are engaged exclusively in the upkeep of the highways, are all imbued with the spirit of service. The employes of the department are impressed with the fact that they are part of a service organization whose function is to make it possible for the traffic throughout the whole state to travel over the highways with the greatest possible comfort and safety and the least inconvenience.

The highway and railroad problems are alike. The railroad roadbed and rails must be kept in a proper condition for the comfort and safety of the transportation needs of the public. Likewise the highways must be kept in a proper condition for the comfort and safety of the motor transportation needs of the public.

The highways are constantly maintained through a combination of the patrol and gang system. This consists of assigning a man to take care of the small patchwork for a definite length of highway. This work is supplemented by gangs assigned to specific territories to take care of the larger maintenance work until such time as the pavement requires a resurfacing or replacement.

Bituminous Surface Treatments

Bituminous surface treatments and oiling on the highways is done in half width sections. The bituminous material is not put on the second section until the first section is thoroughly dry. This work is scheduled for completion for the whole state by June 15 so that the

summer travel will not be subjected to the discomfort and inconvenience of fresh oil on the road.

Detours

During the construction of highways great care is exercised to not only direct the traffic by properly located detour signs, but the department spends considerable money in placing in good travelable condition the roads used for detours, on the principle that it is our function to provide the best possible traveling surface under all conditions.

Snow Removal

The main highways are kept open to traffic all year round. The department erects snow fences at locations where experience has proved that there is likely to be considerable drifting in heavy snow storms. As soon as the snow begins to fall, the superintendents are notified and when there is a depth of two inches of snow on the ground the equipment is ordered out and the plows and men work day and night until the storm is over. The policy is to fight the storm rather than wait until the snow has ceased to fall and then endeavor to clear the roads which often results in a tie-up for a considerable length of time.

Control of the Use of the Highway

The Pennsylvania Department of Highways has a uniformed highway patrol to enforce the traffic rules and regulations.

At present there are 1,000,000 motor cars registered in the state and it is estimated that this number will double during the next several years. This will greatly increase the traffic and emphasizes the need for well-organized control of the use of the highways. The state traffic problem of the future will not be unlike that of large cities.

All of the states will eventually have traffic police patrolling the roads and stationed at important intersections to control the traffic.

Traffic Lines

Last year the department adopted the policy of painting white traffic lines in the center of the highways on all horizontal curves and for a distance of 150 feet on either side of the curve, and on all vertical curves for a distance of 250 feet on either side where there is not sufficient sight distance to see vehicles coming from the opposite direction. Also on long tangents lines are painted at intervals as a reminder to the traffic to keep on its own side of the road. Nothing the department has done has received more commendation than the extensive painting of traffic lines. The traveling public showed its appreciation of the importance of controlling the traffic in this way by adopting the principle of traveling on the right side of the road in the direction in which they are going, while formerly the custom was to drive in the middle of the road and to turn out for traffic passing in the other direction. There is nothing that will result in minimizing the accidents more than traffic lines.

Guard Rails, etc.

Guard rails consisting of seven-foot locust or chestnut posts, set three and one-half feet above the ground, through which two wire cables are strung are erected on all embankments on state highway routes. There have been many instances where trucks and passenger cars have been prevented by these guard rails from falling a considerable distance over embankments, thus avoiding very serious accidents.

Whitewashing Poles

Telephone poles on the highway routes are whitewashed for a height of

six feet from the ground, to serve as a traffic guide and are very effective, particularly at night.

Grade Crossings

The department has engaged in a very extensive program of elimination of grade crossings and pending their elimination an effort is being made to minimize accidents by placing flashing signals, and by painting checkerboards on the pavement, etc., as a warning to the traffic that a grade crossing is being approached.

Signs and Traffic Signals

Signs are placed three hundred feet on either side of all bridges wide enough for only one way traffic. The signs read, "Narrow Bridge. Width for One Car Only." Signs are also provided at the approach to dangerous hills. The signs read, "Dangerous Hill. Go Into Second Gear." Warning signs are erected approaching all curves, danger signs approaching grade crossings and cross roads, and distance signs at all intersections. About 30,000 distance, direction, danger signs, etc., are erected on the Pennsylvania state highway system.

Arrangements are also being made to place red reflector signals or flashing signals at all danger locations and yellow reflector signals at all warning locations. These reflector signals will be desirable as a traffic guide at night, as signs are of very little use after dark.

Safe Sight

To provide a free and unobstructed view across land located at or near the intersection of any two highways or a highway and railroad or at any curve in the highway, the department is permitted to acquire these lands by purchase or eminent domain, and to prevent the use of them for any purpose

which would interfere with or obstruct the vision of users of the highway. It is not essential that the Department of Highways actually acquire the title to the land. It may by condemnation of view prevent the owner from making any use of it which will interfere with a free and unobstructed view.

Naming and Numbering of Highway Routes

The Department of Highways is now carrying out a program of naming and numbering the highway routes. The plan is to give each through route a name and route number for its entire length throughout the state, also the local name of the roads that make up the through route. These will all be placed on sign boards along the highways. The signs will read for example, "Route 1, Lincoln Highway, Lancaster Road." Route 1 is the route number for the Lincoln Highway in the state of Pennsylvania, the Lincoln Highway, of course, being the name of that route for its entire length in the state. Lancaster Road is one of the local roads that comprise part of the Lincoln Highway.

Control of Public Utilities on the Highway

While public utilities have rights under the law or by franchise to locate their facilities on the highways, the actual location, manner of construction or reconstruction is governed by permits issued by the Department of Highways. This applies not only to the 10,337 miles on the state highway system but also to the 90,000 miles of township and county roads in Pennsylvania.

Vehicular Control

The department's control of vehicular traffic is complete and covers not only the use of vehicles on state high-

ways, but also on the county and township roads. The only diminution of authority is the right granted to cities to impose such restriction as they may deem necessary as to the routing and time of passage of vehicles through their limits. This applies particularly to heavily loaded vehicles.

No one can operate a motor vehicle unless they have been examined by the department and are given a certificate to the effect that they are qualified as an experienced operator.

The legal speed limit for passenger cars is 30 miles an hour and for trucks from 12 to 24 miles an hour, depending upon the weight and whether or not they are equipped with pneumatic or solid tires.

Size and Weight of Vehicles

The weight limitation for motor trucks fixed by law in the different states has led to confusion and a prejudice against motor trucks. This was largely due to the engineers, motor truck interests, and other business interests agreeing upon a limit of weight for the whole state rather than fixing a limit of weight for different classes of highways; for example, terminal highways, through-route highways, and feeders of through-route highways, etc., state highways, extending several miles outside a large center of population connecting with another large center of population or an industrial center, are similar to heavy traffic city streets and they should be built to carry loads of a greater weight than the main highways traversing outlying sections of the state. Likewise, main highways traversing outlying sections of the state should be built to carry heavier loads than the secondary highways, etc. In other words, instead of making a law permitting vehicles of a maximum weight to travel over every highway in

the state, the law should be made with a view to fixing the maximum weight on different classes of highways.

This might be termed "the economic motor truck load for state highways." For example, where there is considerable business that can be carried economically by the heavier trucks, it would pay to build the road to carry the heavier loads, but there is no justification for building all of the roads to carry the heaviest loads just for the sake of accommodating one business concern or an occasional maximum weight load.

All of the roads, however, should be built to carry passenger traffic and medium and light truck traffic. As a matter of fact, the truck traffic today really divides itself into this suggested classification of weight limitations. On the heaviest truck traffic road in Pennsylvania, which is a terminal highway, less than two per cent of the number of truck loads are over 24,000 pounds. The truck traffic is only ten per cent of the total traffic. Therefore, the number of loads over 24,000 pounds on this terminal highway is only about two-tenths of one per cent of the total traffic. On a main north and south highway connecting New York State with Pennsylvania, the loads over 24,000 pounds are only two hundredths of one per cent of the total traffic. Bear in mind that one of these roads falls into the terminal area state highway class and the other in the main state highway class, both of which I am advocating should be built to carry future heavy motor truck traffic. It is the class of highways where the indications point to no necessity whatever for building them for the heaviest motor truck traffic that I am advocating should be built to carry only light and medium truck traffic as well as the passenger traffic. All highways, however, should be built so that what-

ever money is put into them will not be wasted but will be part of the cost of the future construction of the highway. This makes it very important to make studies with respect to the probable future traffic before anything is done on any highway.

The long and short of this brief discussion on the weight of vehicles is that the roads should be built to carry the maximum truck load that can be justified from an economic standpoint, but it is evident that the maximum truck loads can only compete with the railroads within a limited area. Therefore, it is obvious that the blanket limitation such as exists in the laws of most of the states now providing for a maximum weight truck load for all roads throughout the whole state, is not sound.

Under the present laws of Pennsylvania the size of motor vehicles is restricted, the maximum weight of a truck being 26,000 pounds with 19,500 pounds the maximum legal weight on any axle and 800 pounds per inch width of tire, the maximum weight on any wheel.

Public Information and Service

The schedule for applying the bituminous surface treatments and oiling on the different roads is broadcast by radio and is sent to hotels, garages, etc., throughout the state for the information of the traveling public.

(1. Detour Information.) As an aid to tourist travel the department publishes each week during the construction season a detour map which is broadcast all over the state and sent to hotels, garages, etc., also in neighboring states, showing the location and giving the latest information in connection with all detours.

(2. Tourist Guide.) The department publishes a tourist guide giving all the desirable information relative to

the scenic highways, summer resorts, camping sites, etc.

Historical Site and Information Signs

Signs are erected calling attention to all important historical sites and where highway routes pass rivers and streams, signs are placed giving the name and other pertinent information. Signs are also erected on either side of boroughs and small communities through which highway routes pass stating the name and date of incorporation. Signs giving altitude are placed on all summits on the mountain highway routes. It is the policy of the department to erect information signs at all locations of interest to the travelling public.

Camping Sites

Provision has been made for camping facilities for tourists along some of the main traveled routes.

Æsthetic Considerations

(1. Planting of trees and grass.) The Department of Highways co-operates with the State Department of Forestry in the planting of shade trees along state highway routes, and with the State Department of Agriculture in planting grasses on unstable slopes.

(2. Vistas.) It is the policy to widen the roads to arrange for vehicles at locations on highway routes where there is an opportunity for an unusual view. In many such locations a vista is arranged for by trimming the branches of the trees to provide for an unobstructed view.

Highway Transportation

By J. GORDON MCKAY, PH.D.

Chief, Division of Highway Economics, U. S. Bureau of Public Roads

HIGHWAY transportation deals with the movement of persons and goods over the highway, and concerns the instruments of transportation, the highway and the vehicle, as well as the services rendered by these transportation instruments. The highway and the vehicle are means to an end, the production of highway transportation services.

The United States Bureau of Public Roads, in co-operation with several state highway departments, is conducting a series of highway transportation surveys to determine the fundamental facts and principles of highway transportation to guide highway engineers in the economic planning and construction of highway systems to serve present and future traffic needs.

The principal purposes of these surveys are as follows:

1. Highway administration and engineering data

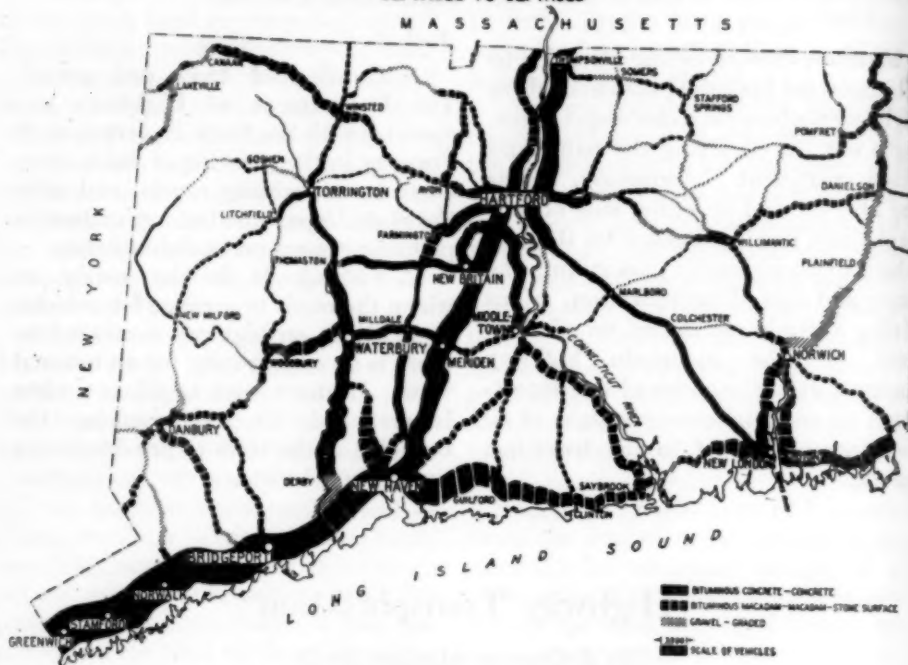
1. To determine daily, seasonal and yearly traffic flow and distribution on state highway systems. (See chart on page 128.)

2. To estimate future traffic on state highway systems.

3. To determine the relation of traffic density to the factors responsible for the growth of traffic, such as motor vehicle registration, production and population.

4. To classify highways as industrial, high, medium, or low-type traffic routes based on (a) passenger car and motor truck density and (b) motor

CHART I
AVERAGE DAILY TRAFFIC ON CONNECTICUT HIGHWAY SYSTEM
 PASSENGER CARS AND MOTOR TRUCKS
 SEPT. 1922 TO SEPT. 1923



U. S. BUREAU OF PUBLIC ROADS 1924

truck capacities, gross loads and wheel loads.

5. To determine the maximum loading and frequency of critical loads on the highways as an index of pavement width and design requirements, and to establish factors of highway traffic width and design for highways contiguous to large centers of population.

6. To measure the effect of congestion at intersections and "bottle necks" upon the rate of traffic flow.

7. To estimate the extent to which the improvement of old or the opening of new traffic routes is economically justified.

8. To correlate traffic loads and density on the highways with highway construction and maintenance costs.

9. To determine the type and volume

of traffic on the highway as an index to the allocation of highway construction and maintenance funds.

10. To determine the distribution of motor truck loads and the amount and frequency of motor truck overloading.

11. To compare the cost of various types of highway improvements such as relocations, grade reductions, elimination of grade crossings (both rail and highway) with the estimated saving in transportation costs resulting from such improvements.

12. To compare the earning value of the state highway system (based on passenger miles and freight ton miles) with the present worth of the highway system using replacement value minus depreciation as the basis of computing present worth.

2. Highway economic data

1. To obtain highway transportation information concerning the volume of tonnage shipped by motor truck, marketing methods, and the relation of highway transportation to other types of transportation.
2. To determine the mileage zones of motor truck haulage and the relation of the type of commodity hauled to such zones.
3. To determine the net tonnage of freight transported by commercial trucking companies.
4. To determine the situs of ownership of passenger cars and motor trucks operating over the highway systems.
5. To estimate the value of motor truck net tonnage hauled over the highway systems.
6. To determine the type of origin and destination as well as the origin and destination of net tonnage of commodities transported by motor truck over the highway systems.
7. To obtain information concerning the relation of motor truck transportation to other methods of transportation, particularly as to competition, rates, operating schedules and delivery time in the short, middle distance and long haul mileage zones.
8. To obtain data concerning haulage practices of motor truck operators and the volume of tonnage transported by motor truck between various cities and areas of value to governmental agencies charged with the regulation and control of highway transportation.
9. To estimate passenger car business and non-business usage of highways.
10. To determine the proportion of farm traffic on the highways.

In 1900 highway transportation was a local movement consisting almost exclusively of horse-drawn vehicles.

In 1899, 3,897 motor vehicles were manufactured in the United States; in 1923 the number of vehicles produced increased to 3,938,206. The rapid growth in motor vehicle registration in the United States is an index of the present significance of highway transportation. Registration of motor vehicles increased from 1,258,000 in 1913 to 15,127,000 in 1923, an increase of approximately 1,200 per cent. Highway traffic increased 47 per cent in California from 1920 to 1922 and 48.8 per cent in Connecticut during the same period.

VARIETY OF NEEDS MET BY TRUCK

The wide variation between the size of traffic units on different roads, with large truck capacities and heavy loads on some highways and small truck capacities and light loads on others, clearly indicates the necessity for different types of highway construction and design to serve present and future traffic needs on different routes. A highway on which 20 per cent of the trucks are 5-7½ tons capacity requires a heavier and more substantial type of improvement than a highway on which there are no truck capacities larger than 2½ tons. Over 20 per cent of the truck traffic on the Lincoln Highway between Philadelphia and Ardmore, Pennsylvania, is 5-7½ ton trucks, while on the Erie-Meadville, Pennsylvania, highway 85.2 per cent of the trucks are 1-1½ ton capacities with no trucks exceeding 4 tons capacity.

The average passenger car trip in Connecticut is 46.6 miles; 35 per cent of the passenger car traffic is a business movement. Of the total vehicles on the highway but a small percentage are farm owned vehicles: 5.4 per cent in Maine and Pennsylvania.

Truck transportation on the Connecticut highway system contains an important element of interstate commerce.

Less than 50 per cent of the total truck ton mileage on the Connecticut highway system consists of trucks operating entirely within the state of Connecticut, and 18.8 per cent consists of movements whose origin and destination are points outside the state of Connecticut.

The motor truck is used to transport every conceivable type of commodity, perishables and non-perishables; solids, liquids and gases; light weight and heavy commodities; commodities of low value such as refuse and junk; and commodities of high value as silks and silverware. On the Connecticut highway 74.5 per cent of the net tonnage is manufactured products and 7.4 per cent products of agriculture. In California 48.5 per cent is manufactured products and 23 per cent products of agriculture.

PERCENTAGE OF TRUCK AND TRAIN COSTS

Although 350 different commodities were transported by motor trucks in Connecticut, it was found that 19 commodities made up 50 per cent of the total tonnage, and between 30 and 40 per cent of the total was consumption goods.

The significance of the motor truck in the distribution of goods is indicated by the fact that over one-third of the total trucks in Pennsylvania originate and terminate at retail and wholesale establishments.

The net ton mileage of motor freight transported over the Connecticut state highway system during the year period from September, 1922, to September, 1923, was approximately 88,000,000 ton miles. Average railway receipts for the period 1920-1922 were 1.16 cents per ton mile. On this basis the cost of transporting this tonnage by rail would have been \$1,020,800. Since motor freight consists of a large proportion of

higher classification freight than railroad freight, the actual costs to ship the above tonnage by rail would be considerably higher.

The total passenger miles over the Connecticut state highway system for the same period was approximately 1,439,000,000. Average railway receipts per passenger mile for the period 1920 to 1922 were 2.94 cents per passenger mile. Using average receipts per passenger mile and applying them to highway passenger mileage, the cost to the traveling public if traveled by rail would have been \$42,306,600. All this traffic would not move by rail, but on the other hand 2.94 cents per passenger mile is only 7.35 cents per passenger car mile, which is a very conservative estimate of the passenger car operating costs per car mile. Using average railway receipts per ton mile and passenger mile as a basis of calculation, the total cost of highway transportation over the Connecticut highway system from September, 1922, to September, 1923, was \$43,327,000.

Railway charges for maintenance of ways and structures from 1911 to 1922 were 13.3 per cent of operating income. Applying this same ratio to highway transportation in Connecticut the annual earnings of the highway system for the year period were \$5,762,000. The present worth (replacement value) of the Connecticut state highway system has been estimated at \$30,000,000 exclusive of right of way. On the basis of this valuation the Connecticut state highway system earned an annual return of 19.2 per cent for highway service.

REGULATING MOTOR TRUCK TRANSPORTATION

The efficient handling of freight at both ends of the railroad "line haul" is but one of the important fields of motor truck transportation. The com-

plete haul by motor truck between points of origin and destination, usually 30 miles or less, has developed into an important industry with a far reaching effect upon processes of distribution and our economic life. Motor truck service is usually a complete movement from a shipping platform to the receiving platform of the consignee without reloading or transfer. For goods requiring rapid delivery such as perishable food products, meats, bread and bakery goods, commodities of high value on which insurance and interest on capital invested during the period of shipment is an important factor, and for goods requiring rapid movement or delivery at a specified time, this service is especially valuable.

In general, motor truck transportation of freight in Pennsylvania and New England is primarily a short haul, non-competitive movement. Motor trucking companies are loosely organized, the competition between truckers is sharp and rates fluctuate rapidly. The recent trend indicates a gradual growth of larger and better organized companies which will ultimately insure stability of rates and service.

Regulation of commercial motor transportation companies is essential to the economic development of this new type of transportation. The unfair competition and practices of the irregular, "itinerant" operator are detrimental to the operation of reliable companies.

Regulation of commercial trucking companies franchised to serve a given trade territory will result in better service, stabilize the rate structure and insure a reasonable rate of return to operating companies. The primary reason for the motor truck transportation of freight is rapid and efficient service. The rate charged for haulage is second in importance to prompt and reliable service.

The principal fields of operation of the motor truck in the transportation of freight in the order of their importance are as follows:

1. Organized urban motor truck transportation of freight in congested terminal areas consisting of terminal to terminal transfers as well as pick-up and delivery service.

The congestion of incoming and outbound freight will be reduced, freight cars unloaded more rapidly and more efficiently utilized in the line haul of freight; and the incoming and outbound L. C. L. freight will move more rapidly.

2. Organized motor truck freight service supplementing existing rail and water service. This service is of two kinds. First the extension of freight service into districts without rail or water facilities or with inadequate service. This development is especially desirable to stimulate the growth of new trade areas. Second, the development of combination motor truck and rail transportation of L. C. L. freight. The development of this type of transportation is well illustrated by the Pennsylvania Railroad's transportation of L. C. L. freight by motor truck on divisions where passenger and freight train movement is congested and the transfer of L. C. L. freight to motor truck lines increases the efficiency of train and freight movement. The basis of the development of motor truck transportation by the Pennsylvania Railroad is twofold. First, the prompt and reliable movement of L. C. L. freight; and second, increasing safety in train operation on heavy traffic divisions by partial elimination of "peddler" trains and steam cross-overs against the traffic.

3. The short haul transportation of freight primarily within the short haul trucking zone of 30 miles or less. The bulk of highway transportation of

freight is transported within this zone.

4. The long distance motor truck transportation of a few special commodities, such as household goods, in which rapid delivery and savings in packing and crating costs justifies the movement. The net tonnage trans-

ported by motor truck in the longhaul-zone is not important and it is doubtful if it will ever develop into a significant movement. The trend during the past two years in the New England territory has been to shorten rather than lengthen the haul of motor trucks in the transportation of freight.

Highway Location

By W. W. CROSBY

Location Engineer, Department of Highways, Commonwealth of Pennsylvania

SOME of the peculiarities of Boston streets have been attributed to their having been developed from paths through the woods located by cows, just as many of our country roads follow old game trails, but it would hardly be fair to say that our public highways have generally been located so unscientifically. On the other hand it is a fact that most public roads, except perhaps for those highways built in the Napoleonic and Roman eras, have been located on the bases of selfish and political interests.

GROWTH OF PUBLIC ROAD SYSTEM

The first settlers connected their dwellings with paths which have become streets. The first settlements tied themselves together with roads which have become main highways. As the settlements pushed westward and the country generally became more thickly occupied, the growth of the road system proceeded mainly on the same basis. Connections were made between individuals or small groups of individuals in their interests and for the means of locomotion then available, that is, successively for pedestrians, horse-back riders and slow-moving, animal-drawn vehicles. Relatively little change in the original routes cleared through the forests, or

marked across the plains toward feasible crossing of the streams, took place between the first use of the route as a foot path and the later improvement and use of the route as a roadway. With the establishment of the routes came the settlement of the lands along them and thus the further determination of the location of the existing roads.

Possibly an exception to the foregoing brief general statement should be noted. Some of the roads connecting settlements were built as toll-roads and in these cases usually the rudiments of scientific location were evidenced by such charter requirements as limited the length, breadth or grades.

As the importance of means of inter-communication particularly between centers of population increased, scientific considerations entered more and more to influence the lines and grades of roads. And as the communities organized into states and the Nation itself began to recognize the community of interest in the public roads and to assume the responsibility for at least the main roads, location questions began to crystallize in forms similar, in some ways at least, to those of the present time.

Originally the interest and respon-

sibility laid with a few individuals. That individual interest still remains and always will persist. But as the individual interest in other matters inevitably became subsidiary to the community interest, so the location of the highways from house to house and along property lines, where each owner gave one-half the right of way necessary for the road, or, in order to avoid damage to an individual farm land, the road location was detoured through less valuable land, that location became a matter in which a far larger number of people were vitally interested than those simply owning the land or living directly on the roadside.

The defective locations from the larger point of view of some of these older roads impelled communities or states to construct new roads more directly located and thus of greater general public convenience and value. After the union of the separate states, the more general interest in the public highway was evidenced by the improvement of interstate roads and indeed by provisions through the national Congress for national roads. In these broader conceptions some of the primary features of highway location have been manifest. For instance, in the Act of Congress in 1806 a national highway was ordered surveyed and built from Cumberland on the Potomac River, at the head of the canal from Atlantic tide water, to Wheeling on the Ohio River, then the head of navigation down the Ohio and the Mississippi to the Gulf of Mexico. In this act it was provided that the road should have no grades exceeding five degrees from the horizontal.

When the development of the public roads of the United States—more particularly perhaps, that of the more important or through roads, that is, roads of considerable length connecting important centers relatively far

apart or interstate roads—was interrupted by the discoveries and developments of steam railroad construction, the broader conceptions as to the location of highways wilted and practically became dormant. The growth of the public road system went on, but the matter of location reverted to the bases of local or individual interest, and of politics.

THE NEW NEED FOR SCIENTIFIC ROAD LOCATION

About thirty years ago there sprang up in some of the more progressive states a general public desire for better road surfaces, and modern highway work was begun in this country. By that time the public road systems of most of the states had grown to reach mileage figures, most of them unwieldy and to some extent unnecessarily high. To satisfy the demands for "all the year roads" required large expenditures, according to the ideas of the times, and it soon became generally accepted that a selection from the existing mileage would have to be made to keep within the means of the state and to produce the results needed. So the problem of selection became evidently a primary problem of highway location, in the broader sense, and it opened wide the door for political influence.

Naturally every inhabitant of the country wanted the improved roads to convenience him, and, equally, every community wanted the main highway to serve it. In the earlier stages of the legislation the acts were confined to the improvement of the existing roads, and the state authorities, to whom the administration of the law and the execution of the work was delegated, were given little, if any, opportunities to consider and effect changes of existing highway locations with a view

to improvements in them for the general benefit.

In some of the states the initiative for the selection of the roadways to be improved was left with the local or county authorities, and where the local or county interest did not accord with the more general public interest a deadlock might result. In some other states the legislature provided commissions for the selection of limited mileages of the existing public roads, which selected roads were to be improved by the states, but no provision was made for the consideration of new locations. In other states, of which possibly the most noted examples are New York and Pennsylvania, the selections from the existing public roads were made by the legislators themselves. In Pennsylvania, out of some 85,000 miles of existing public roads in the state, the legislature selected approximately 11,000 as the state highway system to be "taken over by the State Highway Department from the several counties or townships of the state" and when so taken over "to be constructed, improved and maintained by the State Highway Department at the expense of the Commonwealth." The Pennsylvania legislature provided this "system of state highways" should form and be "much traveled roads or routes between the county seats of the several counties of the Commonwealth and much traveled roads or routes leading to the state line and between principal cities, boroughs and towns" and then "more particularly described and defined" them by numbers, by termini for each numbered route, and by villages, settlements, boroughs, towns or other identifying and recognizable points through which each route should pass between its termini.

It can be readily appreciated from the foregoing that the opportunities

for and the probabilities of selfish and political influence seriously affected the selection,—that is, the location—of the routes of the state highway system established in this way. As a matter of fact many more routes were proposed than were established by the act and compromises in the legislature were numerous.

In these states, since the original establishment of the state highway system, those dissatisfied with it have with more or less success continuously attempted to modify or to add to the original selection (or location) by additional routes similarly described. In the legislative session of New York state this last winter the political influence for modification of the existing state highway system succeeded in passing an act through legislature which was vetoed by Governor Smith, and his veto message embraced the following phrases in comment on the legislative act. He referred to the addition of modified routings as "laid out as a matter of political favor" and as comprising "dead end roads," "parallel roads," "roads in sparsely settled sections." He further expressed himself to the effect that road location was "not a legislative function" but that it was "administrative and best carried out by the state's engineers."

Commenting on and supporting Governor Smith's action the *Engineering-News Record* for May 15, 1924, said editorially in regard to road location that "only trained officials may assume to undertake the solution."

Here we have, for the first time perhaps, clear recognition by high authorities of the scientific basis on which road location—which, of course, involves selection—should rest.

Another state nearly twenty years ago approached her location problem,—that is, the selection of a limited

mileage from the total mileage of public roads in the state,—by the legislative creation of a commission authorized and directed “to select such a system of main market roads in and throughout the state as could reasonably be expected to be improved with the funds provided”—\$5,000,000. Again note the limitation by the word “selection” to the then located roads and the absence of even any suggestion, to say nothing of authority, for revising the existing locations from scientific standpoints. In spite of the fact that the average cost of road improvement per mile in the state to that time had been kept down to \$8,000 per mile, the commission, composed of four professional politicians, two scientists and a business man, selected over 1,200 miles of the existing roads under the act. This was done by the politicians referred to, in spite of the protest of the scientists and the business man.

The instances above cited are brought forward, not as horrible examples, but as reasonably fair illustrations of how road location has up to the present time and generally been based, as first stated, on other than scientific fundamentals.

WHAT MAKES A HIGHWAY

In the Pennsylvania law, however, appears the first real recognition of the fact that other bases than those of political and selfish interest may effect the location of highways. That law provides, in a section subsequent to those establishing in detail the numbered routes, that the State Commissioner of Highways may change or divert the present location of the roads or routes of the state highway system whenever it shall appear to him that “any part or portion of a state highway as now defined and described” shall be “dangerous or inconvenient,” exces-

sively or unreasonably expensive in construction and repair, “either by reason of grades, dangerous turns or other local conditions.” This was certainly a step forward, even though official legal construction of the act itself has resulted, practically, in limiting the relocations found desirable to stretches of the existing highway between points mentioned in the act locating the highway in question.

The solutions of most of the problems connected with road improvement have been begun with the road surface. It has taken time and a general awakening of interest in the act to uncover the fundamentals and to expose them for examination and comprehension in order to properly solve these problems for satisfactory superficial results. And it has required them and the development of the automobile to expose the problem of highway location in all its importance, to direct public interest toward the problem, and to set scientists and economists to work at comprehending it and establishing theories and formulae for its solution.

In relatively recent years the public has acquired some comprehension of city planning and some progress has been made in the science of it. Most cities have like Topsy “just grown” though one at least—our own national capitol—has developed along a well defined and preconceived plan. But all progressive cities have been brought to considering possibilities for correcting through proper planning their defective lay-outs even at this late date, and wherever new cities or villages seem conceived to be born nowadays, plans for their development are prepared in advance. Similarly regional planning for areas around or adjacent to cities is attracting attention and being studied. The incentive in this latter matter is undoubtedly the auto-

mobile, with its increased radius of action for the transportation of both persons and goods. With the further development and improvement of the automobile, which is sure to come, will not this "regional planning" be extended to far greater areas or, at least, to embrace in the near future the connection of skillfully planned regions by suitably located highways?

It is hardly to be expected that the old roads will entirely disappear in any event. It would be absurd for any man or any group of men now to attempt to impose on the map of Pennsylvania a system of state highways aggregating ten or even twenty thousand miles in length, disregarding the existing roads and considering only the larger centers of activity for connection and the topography of the country as the controls of the lines. Even should an apparently reasonable system be thus proposed, no one could say with confidence that such a system would continue to be satisfactory by the time it could be built.

On the other hand every one knows from his own experience in traveling over the public roads that absurdities of location are constantly to be met. They vary from a little detour forced on the local traveler by the ramp, leading up into a farmer's barn placed too near the road and thereby obstructing to a greater or less extent public use of the road purely for the convenience of the individual, to the detour forced on the traveler over longer distances who has to go two or three miles further than should be necessary, because the public highway improved between two large termini swings off to one side for the benefit of some small village or settlement, which latter contributes very little to the traffic on the through road. Or it may be that the truck carrying produce to market from a considerable dis-

tance has to consume excessive time and fuel in following the old road on bad locations with unnecessary grades that now are of no advantage to any one.

The science and art of steam railroad location were exhaustively set forth in a monumental work¹ many years ago. They have received the benefit of wide discussion and investigation since, with the progress naturally to be expected. But the application of the conclusions therefore cannot be applied to highway problems except in a most general way because of the great changes in the character of the motive power and vehicles. However, the problems of highway location are being recognized and, here and there, analyzed at last.

The development of the automobile is largely responsible for a recognition of the importance of proper highway location. Solutions of location problems will not be established before they are needed generally, and in some of the more progressive states circumstances already compel attempts at the solutions of some problems by tentative methods and formulae.

The State Highway authorities of Pennsylvania are confronted with the responsibility and duty, under the legislative act before referred to, of obtaining at least proper locations for the state highway system between the points fixed by the legislature, some of which are miles apart on any route. If now the route shall be, in the opinion of the State Secretary of Highways, of secondary importance, that is if it shall perhaps merely parallel and supplement a better, more popular, or, for some other reason, more important route between two main centers of population and shall not have been accepted as a section of the Federal

¹ A. M. Wellington's *Economic Theory of Railway Location*.

Highway System established by acts of Congress, the existing roadway will determine the improved roadway unless it can be demonstrated that the present lines and grades are dangerous and inconvenient to the public or would be excessively expensive to improve, to maintain and to operate as a public highway. In the case of a primary route,—that is, a route between important points which has been established as a section of the Federal Highway System,—greater scrutiny must be given to the present location of the highway in order that the intent of the act and the duties of the department under it shall be fulfilled.

ANALYZING TRAFFIC CONDITIONS

Directness of routes between termini is important and every possible effort to avoid unnecessary length between the termini must be made by taking every profitable advantage of the topography. The speed of traffic nowadays, which the automobile has increased from an average figure of perhaps five miles an hour and a maximum of ten or twelve to an average figure of twenty-five miles an hour and a maximum of possibly fifty, must be carefully regarded with a view to preventing accidents being caused by too sharp turns in the roadway or such obstacles to vision and speed as defective location might bring about. Again, while as the old saying goes, "the bale of a bucket is no longer lying down than standing up," it is recognized that somewhere between the level grade and an allowable maximum the lines and grades of the roadway may vary with advantage to the road users. Generally no sign of recognition of these principles is given by the old road locations, and it, therefore, becomes necessary in considering the suitability of the old roadway to apply these principles in order to insure that

improvement which will give the greatest possible satisfaction to modern traffic.

In order that excessive expenditures may be avoided, if possible, and at the same time that sufficient expenditures for satisfactory results shall be made where necessary, it becomes imperative to know the amount and character of traffic using any section of highway under consideration for improvement and as far as possible to estimate the proper changes in traffic over that section after the improvement shall have been made and during a reasonable period of expectation for the life of the improvement.

From a knowledge and study of what the present traffic is on a main highway, of the developments existing or apparently probable along the highway, and of the character and circumstances of the termini of the route comprising the particular road in question, it is possible to estimate fairly accurately the needs, including those of location, for the section in question. From such a study and knowledge of existing conditions one can certainly better estimate at least what the probable needs will be within a reasonable period. A curve of increase in traffic generally can be plotted from the statistics to date, and its direction indicated with reasonable certainty, although prolongation of the curve in the indicated direction too far cannot now be safely made. As the traffic is resolved into its component parts, such as pure pleasure traffic, semi-business traffic, commercial traffic, trucking, etc., the greatest care must be used in projecting the separate curves, even when the limited information at hand makes their plotting to date possible.

STUDIES OF PENNSYLVANIA HIGHWAY DEPARTMENT

There is great need for further investigation on these lines. Realizing

this need, the Pennsylvania Highway Department is devoting a great deal of attention to investigations and studies of this character. Some information has been accumulated and some conclusions tentatively reached. Those of the latter that are regularly used may be conservative, but it is believed they are at least safe.

Let us suppose that the legislative act provides for a state highway running northerly "from D to R by way of the town of F"; that this highway is of primary importance in the state system; that D is quite a sizable market and shipping center for a prosperous surrounding country as also is R; that F is a minor intermediate point without extraordinary characteristics. The old road runs from D to F about as directly as the topography will permit, but from F toward R wanders around behind some hills, over some others, and finally comes back to the direct line between D and R at the point B, having covered some ten miles of distance between D through F and around and back to B, from which point it runs on fairly directly to R, the legislative terminus of the route.

In the preliminary surveying of the old existing road, it becomes evident that a much more direct and shorter line with better grades can be obtained from F to B by abandoning the old road beyond F and taking a new line for the state highway down the valley a couple of miles, at the maximum, to the east of the old road and rejoining the old road close to the point where it enters B. Estimating the cost of improvement in either case and on a basis of similar results, of course, it is found that, owing to the easier grades, shorter length and other advantages of the new route, the first cost for improvement will materially be reduced by the selection of the new location.

This in itself might mean to justify—in fact, to demand—that the Secretary of Highways take the new location for the state highway, under the requirements of the legislative act for economy in construction. But let us suppose that for some reason or other the estimated costs should be practically the same in either case. Naturally there will be opposition to the selection of the new route. For instance, the old road, as we may grant in this particular case, leads through a well-developed and fairly thickly-settled, prosperous, farming community, while the proposed new line runs through woodland and undeveloped territory between F and B. But there is another important factor to be considered, and that is the relative costs of traffic operations over either route.

It develops that on this route we are discussing traffic counts have shown an average, between F and B, of 750 passenger cars and 100 trucks per day. The life of the improvement proposed will be at least twenty years. At any rate that is within the life of the bonds by means of which the improvement is to be made, and the construction costs must be amortized within the period. If, as we have assumed, they will equal in each case we may neglect them in the comparison. The operating costs,—that is, the known average annual cost per mile for state highway maintenance plus the actual cost per mile for operating the motor vehicles—will give the cost per mile to the public of either route. Double the actual number of the above counted vehicles must be taken, because experience shows at least that increase in traffic is to be expected on any unimproved section of the state highway system of Pennsylvania when its improvement shall have been completed, and that this increase will certainly occur in ten years from the time of the

improvement if not usually much before that.

The resulting comparison of operation costs will show in twenty years an aggregate difference of between three and four million dollars in favor of the shorter and more direct line, and the decision as to which line should be selected by the Commissioner of Highways is relieved of all uncertainty. There can be no question in such a case as this but that the public interest must take precedence over the local and individual interests and the shorter and more direct location for the primary state highway route be adopted.

It is in this way that the problems of location in Pennsylvania are being approached. Few cases are as simple and as clearly solved as the one above stated, which is rather briefly described but really is an actual recent case. The department's policy is to adhere to the old rights of way unless a relocation is shown to be clearly advisable from economic or engineering bases. The economic arguments for relocation must be clearly established by existing facts or those recognized as inevitable. The engineering bases for relocations are those brought up by the establishment of certain maximum grades (the Federal Government has placed a limit of 7 per cent as the maximum grade acceptable on the roads receiving Federal aid, which means practically the entire primary system of the Pennsylvania state highway) and certain minimum radii for curves (the internationally agreed upon minimum is a radius of fifty meters, but the Pennsylvania minimum sought is nearer twice this radius), together with the possibilities discoverable for the most direct and shortest line between the fixed points of the route.

The surveys first made of the existing highway reveal its defects from

these viewpoints as well as its advantages from other angles as a final location. The effort is first made, when considering its improvement through the points mentioned in the legislative act describing it, to adjust the lines and grades of the existing roads to within the limits of acceptability for both and to estimate the cost of so doing. The possible alternatives securable by relocation are then carefully investigated and their costs estimated. The costs of operation based on the known traffic and the probable traffic within twenty years are then compared and in that way an estimate is reached as to how the general public interest may be effected by different locations of the roadway. When this shall have been done the effects of the different locations under consideration, on the locality and the individuals directly concerned, are carefully investigated. Usually there is little difficulty in having these interests presented for consideration, while the public interest, *i.e.*, "the greatest good to the greatest number," seldom has corresponding advocates in evidence and usually remains merely the obligation or duty of the Department and the Secretary of Highways.

FUTURE GROWTH AND PROGRESS

While in Pennsylvania progress is being made toward the scientific location of state highways, and it is believed Pennsylvania leads and is much farther advanced on these lines than any other state, it is equally true that all are still "pioneering" along this line. The science of highway location is very young and immature. For instance, there is very little data really established to prove what maximum grades should not be exceeded by state highways improved for the convenient and economical operation of motor trucks or passenger automobiles or a

combination of both. Some praiseworthy experimental work toward this end has been done by one or two individuals and it is on the results of their work that the present conclusions are based, even though those experimenters admit the insufficiency of their data.

It is impossible as yet to visualize very far ahead the probable developments of automobile transportation and to plan with certainty for satisfaction for it ten years hence with road improvement work to be done now. Whether still heavier and larger loads are to be carried by super-trucks on the highways, or whether goods transportation over the highways will be done by trains of trailers with each unit of the train even within the maximum load limits now prescribed, is a matter on which there is at present no general agreement of opinion and which probably depends largely, if not entirely, on the inventive genius of automobile engineers, whose offspring are not yet clearly indicated. Yet the plans of the highway engineers concerning road location will be materially affected as conclusions on these questions shall be reached.

At present only a small amount of the total traffic over the state highway system extends for more than fifty miles from the centers of population, but even this radius is considerably greater than it was a few years ago

and entirely different from the corresponding figure before the advent of the automobile. As the automobile has developed the figure has increased, and so it may be expected to increase for both commercial and pleasure traffic. This enlarges the field for problems of highway location and increases their importance.

Some states have profited materially by taking advantage of their natural scenery. Pennsylvania certainly is equipped to do so and probably the best opportunity for accomplishing this end is offered by the improvement of the state highway system. The economic and engineering problems are complicated by the psychological factors thus introduced and to which it is difficult, at best, to assign arithmetical equivalents in the equations.

The foregoing perhaps suggests rather than demonstrates the importance of highway location, the complexities of its proper consideration, and the efforts of the Pennsylvania State Highway Department to keep at least abreast of the times in this feature of its work. It is hoped that the reader may be convinced at least that the Pennsylvania Highway Department has recognized the development of highway location problems proceeding from automobile development and is also making a sincere effort to solve them.

Taxation of Motor Vehicles in the United States

By JAMES W. FOLLIN

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I. MODES OF TAXATION

FEDERAL, state and, in some instances, municipal governments levy taxes on motor vehicles. The combined taxes in 1923 totalled nearly \$500,000,000, and were roughly in the proportion of 33 per cent Federal, 64 per cent state, and 3 per cent municipal. The following is an analysis of the 1923 taxes:

EXCISE TAX	
Passenger cars	5% of selling price
Commercial vehicles	3% " " "
Parts, accessories, tires	5% " " "

OCCUPATIONAL TAX ON MOTOR VEHICLES CARRYING PASSENGERS FOR HIRE	
Seating capacity over 2, but not more than 7	\$10
Seating capacity over 7	20

During the past five-year period, the receipts from Federal taxes have exceeded \$600,000,000, and have averaged \$120,000,000 a year.

MOTOR VEHICLE TAXES IN 1923

<i>Federal</i> ²	
Passenger car	\$106,290,234
Commercial vehicle	10,908,777
Parts, tires and accessories	38,610,844
Vehicles for hire	1,907,400
	<hr/>
	\$157,707,255
<i>State</i> ³	
Registration fees, including:	
Drivers' licenses	\$188,970,992
Gasoline taxes	36,813,940
Personal property taxes	75,000,000
	<hr/>
	300,784,932
<i>Municipal</i> ⁴	
Motor vehicles	13,070,210
	<hr/>
Grand total	\$471,571,397

Figures taken principally from 1924 edition of "Facts and Figures of the Automobile Industry" of the National Automobile Chamber of Commerce.

II. FEDERAL TAXATION

On January 1, 1924, the following Federal taxes were operative:

¹ The author was aided in the preparation of this article by his assistant, Claude M. Stroup.

² Source, Internal Revenue Bureau, U. S. Treasury Department.

³ Source, Bureau of Public Roads, U. S. Department of Agriculture.

⁴ Source, Compilation by National Automobile Chamber of Commerce from reports by City Treasurers, and does not include property taxes on the garage or local or state taxes levied on retail business.

These Federal motor vehicle taxes have constituted an increasing percentage of the total receipts from internal revenue, being over 5 per cent of the total in 1923, and have more than supported Federal aid to the states for road construction.

III. STATE TAXATION⁵

State tax levies on motor vehicles may be divided into three general classes: registrations, taxes on motor fuels, and personal property taxes.

⁵ A complete digest of State Laws, in force on January 1, 1924, is available in the 1924 edition of "Special Taxation for Motor Vehicles," published by the Motor Vehicle Conference Committee, 366 Madison Avenue, New York City.

FEDERAL MOTOR VEHICLE EXCISE TAXES

Calendar Year	Automobile Trucks and Wagons	Other Autom- obiles and Motor- cycles	Tires, Parts and Accessories	Total
1919.....	\$8,765,123	\$52,860,310	\$30,735,395	\$92,360,828
1920.....	15,134,594	83,128,363	50,944,562	149,207,519
1921.....	8,245,404	51,237,358	40,484,660	99,967,422
1922.....	9,583,212	69,856,599	35,353,589	114,793,400
1923.....	10,908,777	106,280,234	38,610,844	155,799,855*
				\$612,129,024

* Does not include \$1,907,400 Federal tax on motor vehicles for hire.

Registrations

Registrations include the following more or less distinct groups:

Passenger motor vehicles
 Commercial motor vehicles
 Motorcycles
 Tractors
 Trailers
 Motor dealers
 Passenger carriers
 Property carriers
 Motor vehicle operators
 Registration of titles

The bases for determining fees for the registration of passenger and commercial vehicles vary widely between the several states, and for a complete analysis of the subject, the reader is referred to other sources.⁶ The various state regulations have been summarized, however, in Appendices 1 and 2 to this paper, reference to which will indicate that in the case of passenger motor vehicles, the most popular basis is the rated horse-power of the motor, and the weight of the vehicle as the second most widely used basis. With commercial motor vehicles, the carrying capacity is the predominating basis for the registration fee.

⁶ See the article, "Motor Vehicle Fees and Gasoline Taxes," by Henry R. Trumbower, *Economist*, U. S. Bureau of Public Roads, in the September, 1924, issue of *Public Roads*, Vol. 5, No. 7.

Forty-two states use the calendar year as the registration year. All but two states, and the District of Columbia, grant periodic reductions in registration fees when registration is made after a part of the registration year has expired. Two states grant a uniform reduction of one-twelfth per month. Exactly one-half of all the states reduce the registration fee to 50 per cent of the annual fee when six months of the registration year have passed, while ten other states make such a reduction after seven months, six others after eight months, and four others after nine months. Full information in regard to reduction of fees is shown in Appendix 3.

Reciprocity between states with regard to motor registration is effective in whole or in part with only seventeen states. Registration of non-residents is required after the following periods in the cases of the other states:

15 days.....	2 states
20 days.....	1 state
1 month.....	7 states
2 months.....	5 states
3 months.....	14 states
4 months.....	1 state
6 months.....	2 states

All but fourteen of the states license motor vehicle operators, usually on an annual basis, although in a few states,

the licenses are valid until cancelled. The original fee in some instances is greater than the annual renewal fee. Distinction is also made in some states between paid drivers and non-paid drivers, or, as it is frequently expressed, between operators for hire and not for hire. Several states now require examination of applicants for license with regard to their knowledge of car operation and motor laws and regulations. In Pennsylvania, for example, an applicant for license secures a learner's permit, good for thirty days, which can be used if a licensed operator is in the car and in control of the car's operation. An operator's license is obtained if the applicant passes successfully the examination given. A summary of the regulations of the several states is given in Appendix 4.

With the exception of North Dakota, the several states regulate motor dealers through annual registration, charging fees for car tags which in general are higher than those otherwise charged. The most common practice is to charge a fixed amount to cover a certain number of sets of dealer's tags and an additional amount for each extra set of tags. The majority of states also differentiate between motor vehicle and motorcycle dealers.

Eleven states levy no taxes on property and passenger carriers as such; fifteen states levy such a tax on passenger carriers only, while eleven states place the same taxation on common carriers irrespective of what they carry. The remaining states levy varying taxes on these two types of common carriers.

Motor Fuel Taxes

Since 1919, a new form of levy against motor vehicles has gained rapidly in popularity, namely, a tax on motor fuels, commonly referred to as the gasoline tax. Only two states

levied this tax in 1919, whereas in 1924, thirty-five states and the District of Columbia are collecting it. The receipts in 1923 were \$36,813,940, and it is expected that in 1924 over \$50,000,000 will be received. The levies on gasoline range from one cent a gallon to four cents, with a concentration of states at a two-cent tax.⁷ A detailed collection by states is set forth in Appendix 5.

Personal Property Taxes

In thirty-five states and the District of Columbia motor vehicles are taxed as personal property. In thirteen states, they are not subject to such tax. The exact revenue secured is not definitely obtainable since it is mixed with personal property taxes in general, but on the basis of the value of the motor vehicles in the several states and the rates of taxation, estimates have been made of the amount.⁸ The revenue, moreover, is placed in the general funds of the states, counties or municipalities rather than being made available directly for highway work, as is the case of much of the revenue from other motor vehicle taxation.

IV. MUNICIPAL TAXATION

Information with regard to the extent and amount of municipal taxation of motor vehicles is meagre and only a general statement can be made. In a number of states, the municipalities are permitted to impose local taxes on taxicabs and autobusses, but in only nine states may municipalities collect from privately owned and operated motor

⁷ For a fuller discussion of this tax, the reader is referred to page 207, Vol. XIII, No. 4, April, 1924, issue of the *National Municipal Review*, and to page 1, Vol. 5, No. 7, September, 1924, issue of *Public Roads*.

⁸ National Automobile Chamber of Commerce in "Facts and Figures," 1924 edition, sets the figure at \$75,000,000 for 1923.

vehicle taxes in addition to those imposed by the state.⁹

The only comprehensive information available on municipal taxation was obtained by the National Automobile Chamber of Commerce through a questionnaire sent to treasurers of municipalities of over 5,000 population. Out of 1,497 such municipalities, 597 did not reply, but of the 900 (including most of the larger cities), which did reply, 560 reported no taxes and 340 showed total receipts of \$13,079,209, distributed as follows:

Source	Amount
Motor cars	\$1,243,335
Motor trucks	218,580
Busses	42,899
Taxis	198,896
Other common carriers	36,640
Personal property	2,661,448
Miscellaneous or unclassified	8,677,411
	<hr/> \$13,079,209 ¹⁰

V. TREND OF TAXATION

From an annual revenue of \$954 for New York State in 1901, the first state to levy a registration fee, the receipts from registration have progressively grown, as other states adopted registration fees and motor vehicles increased, until, in 1923, \$188,970,992 was collected. Per vehicle registered, the collections have increased from \$3.20 in 1909 to \$12.50 in 1923. The tables in Appendix 6 and the accompanying chart indicate the trend of total registrations, total receipts and receipts per motor vehicle. The chart is drawn from information furnished in Appendices 7 and 8 of total motor vehicle registrations and receipts arranged by states, and from which detailed infor-

⁹ See page 27, "Special Taxation for Motor Vehicles," 1924 edition, Motor Vehicle Conference Committee, 366 Madison Avenue, New York City.

¹⁰ For detailed collections by states, see pages 80 and 81, "Facts and Figures," for 1924.

mation can be obtained with regard to a particular state. This information for each state is supplemented in Appendix 9 by the record of population per registered car from 1919 to 1923.

The increase in registration fees for commercial vehicles has been proportionately greater than for passenger cars. The average registration fee charged in the various states for a 5-ton truck in 1914 was only \$8.80; in 1921 it had advanced to \$96.52 and in 1924 to \$139.39. In Appendix 10, the average rates for 1½-ton, 3½-ton, and 5-ton trucks are compared, also the number of states are listed that charged fees within designated limits.

Assuming an average travel of 6,000 miles per registered motor vehicle in 1923, the registration fees exacted by the various states imposed an average tax of 0.208 cents per vehicle-mile, the lowest rate being 0.080 cents and the highest 0.439 cents. Gasoline taxes imposed an average tax of .041 cents per vehicle-mile, making the average combined state taxes per vehicle-mile, 0.249 cents. In Appendix 11, these average vehicle-mile taxes are listed by states.

Revenue and registrations are analyzed on the basis of population in Appendix 12. Receipts from state registration yielded only about eight cents per capita in 1913 and \$1.70 in 1923. Adding the Federal excise taxes for 1923, registration fees and Federal excise taxes were \$3.13 for 1923. Gasoline tax receipts for 1923 add approximately thirty cents per total United States population (or sixty cents per capita average for the thirty-five states where levied), while the estimate of state personal property taxes adds approximately seventy cents per total United States population, giving a grand total of over \$4.00 per capita during 1923.

APPENDIX 1—BASES FOR STATE LICENSING OF PASSENGER MOTOR VEHICLES

Amounts Shown Represent Minimum Annual Fee

Gross Weight (Vehicle Weight)	Horse Power	Horse Power and Gross Weight	Cost Price or Value	Flat Rate
Delaware ¹	Alabama ^{1,4}	Arkansas	Colorado Max.	California \$3.00
Florida	Arizona	Indiana ⁴	Minnesota	
Idaho	Connecticut ^{11,12} ..	Kentucky	Oklahoma	
Iowa ¹⁰	Georgia	Maine ^{2,4}		
Kansas	Illinois	Michigan ⁴		
Nebraska ⁹	Louisiana	Rhode Island ..		
Nevada ⁸	Maryland	Texas		
New Hampshire ⁸ ..	Massachusetts ..	West Virginia ⁸ ..		
New York	Mississippi ⁶			
Oregon	Missouri ^{1,4}			
South Carolina ..	Montana ⁴			
South Dakota	New Jersey			
Vermont	New Mexico ⁴			
Washington	North Carolina ..			
Wisconsin	North Dakota ^{12,7} ..			
	Ohio ⁴			
	Pennsylvania			
	Tennessee ⁶			
	Utah ⁴			
	Virginia			
	Wyoming			
	District of Columbia ..			

¹ Steam—at flat rate.² Steam—at horse power.³ Steam—same as commercials.⁴ Electric—at flat rate.⁵ Electric—at horse power.⁶ Electric—at flat rate—tags extra.⁷ Electric—at flat rate instead of horse power.⁸ Gross weight of vehicle and seating capacity x 125 pounds.⁹ Gross weight of vehicle and seating capacity x 150 pounds.¹⁰ Gross weight and value.¹¹ By cubic inch piston displacement for gasoline motors.¹² Horse power, factory selling price and net weight.

APPENDIX 2—BASES FOR STATE LICENSING OF COMMERCIAL MOTOR VEHICLES
Amounts Shown Represent Minimum Annual Fee for Pneumatic Tires

Tons Capacity (Carrying Capacity)	Gross Weight (Vehicle Weight Plus Load)	Net Weight (Vehicle Weight)	Horse Power	Tire Width	Chassis Weight
Alabama.....	\$15.00	Delaware.....	District of Columbia..	Oregon ¹ ,.....	Pennsylvania ^{1,2,3} ..
Arizona.....	10.00	Florida ²			
Arkansas ¹	25.00	Illinois.....			
California ¹	10.00	Indiana ¹			
Colorado.....	10.00	Michigan ¹			
Connecticut ¹	15.00	Minnesota ¹			
D.C. ¹	15.00	Missouri.....			
Idaho.....	15.00	Nebraska.....			
Illinois.....	22.50	Nevada.....			
Indiana.....	10.00	New Hampshire ⁴			
Iowa.....	15.00	New Jersey.....			
Kansas.....	15.00	New York.....			
Kentucky.....	22.00	Ohio.....			
Louisiana ²	25.00	Rhode Island ¹¹			
Maine ¹	10.00	Texas ¹¹			
Maryland ¹	10.00	Wisconsin.....			
Massachusetts.....	10.00				
Minnesota ¹⁰	15.00				
Mississippi ¹	11.00				
Montana.....	10.00				
North Carolina.....	12.50				
New Mexico ¹	15.00				
Oklahoma ⁴	10.00				
South Carolina ¹	15.00				
South Dakota.....	15.00				
Tennessee ⁹	15.00				
Utah ²	5.00				
Vermont.....	20.00				
Virginia.....	15.00				
West Virginia ¹	15.00				
Wyoming ⁷	15.00				

Different license fees for:

- ¹ Solid tires, pneumatic tires.
- ² Solid tires, pneumatic tires, air cushion tires.
- ³ Solid tires, pneumatic tires, metal tires.
- ⁴ Pneumatic—same as passenger; solid.
- ⁵ Tags, \$1.00 extra.
- ⁶ Yearly reduction in fees in certain cases.
- ⁷ Pneumatic; any others.

- ⁸ Electric—gross maximum weight.
- ⁹ Carrying capacity and horse power.
- ¹⁰ Gross weight and value.
- ¹¹ Net weight, horse power, factory price, tons capacity.
- ¹² Net weight and horse power.

APPENDIX 3—PERIODIC REDUCTIONS IN STATE REGISTRATION FEES

All States but California, Illinois and the District of Columbia Grant Some Reduction
Proportion of yearly fee to be collected at the expiration of the following months of registration year

1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	11th
Kentucky Mississippi	84% Kentucky Mississippi	75% Kentucky Mississippi Iowa Louisiana Maryland Ohio Oklahoma Rhode Island South Carolina Texas West Virginia	68% Kentucky Mississippi 75% Colorado	68% Kentucky Mississippi	60% Kentucky Mississippi Alabama Arkansas Florida Iowa Kansas Louisiana Maryland Missouri Montana Nebraska Nevada New Mexico New York North Carolina Ohio Oklahoma Oregon Rhode Island South Carolina Texas Virginia 75% Wisconsin	41% Kentucky Mississippi 50% Georgia Idaho Indiana Minnesota New Jersey Pennsylvania South Dakota Utah Vermont Wyoming	53% Kentucky Mississippi 50% Delaware Michigan North Dakota Tennessee Virginia Washington	25% Kentucky Mississippi Arkansas Colorado Iowa Louisiana Maryland Minnesota Missouri Ohio Oklahoma Oregon Rhode Island South Carolina Texas West Virginia 60% Maine Massachusetts New Hampshire Wisconsin	16% Kentucky Mississippi 25% Idaho South Dakota	84% Kentucky Mississippi None Iowa

Connecticut grants reduction of 84 per cent per month after three months.

APPENDIX 4—STATE REGULATIONS FOR LICENSING OF MOTOR OPERATORS

Classified as to Whether Distinction Is Made Between Paid and Unpaid Operators. All Licenses on Annual Basis Except Where Noted. Amounts Shown Represent Annual License Fee

	Paid Drivers		Non-Paid Drivers		No Distinction Between Drivers	
	Original Fee	Renewal Fee	Original Fee	Renewal Fee	Original Fee	Renewal Fee
Alabama ¹	\$5.00	Perpetual	None required	None required		
Arizona.....	5.00	No renewal	" "	" "		
Arkansas.....	5.00	Same	" "	" "		
California.....	2.00	"	" "	" "		
Colorado.....	2.00	"	" "	" "		
Connecticut.....	5.00	"	\$3.00	Same		
District of Columbia.....	2.00	Perpetual	2.00	Perpetual		
Florida ¹	2.00	Same	None required	None required		
Georgia.....	2.00	"	" "	" "		
Idaho.....	2.00	"	" "	" "		
Illinois.....	5.00	\$3.00	" "	" "		
Indiana.....	2.00	Same	" "	" "		
Iowa.....	2.00	"	" "	" "		
Kentucky.....	2.00	1.00	" "	" "		
Louisiana.....	5.00	Same	" "	" "		
Maine.....	5.00	"	2.00	Same		
Maryland ²	3.00	"	2.00	Perpetual		
Michigan.....	2.00	"	.50	Same		
Minnesota.....	1.50	1.00	None required	None required		
Missouri.....	3.00	Same	" "	" "		
Montana.....	2.00	"	" "	" "		
New Hampshire ²	5.00	2.00	3.00	\$2.00		
New York.....	5.00	2.00	2.00	1.00		
Oregon ¹	2.00	Same	None required	None required		
Texas.....	3.00	"	" "	" "		
Utah.....	2.00	"	" "	" "		
Vermont ³	3.00	"	2.00	Same		
Virginia.....	5.00	"	None required	None required		
West Virginia.....	3.00	"	1.00	Same		
Delaware.....					\$3.00	Same
Massachusetts.....					2.00	"
New Jersey ²					3.00	"
Pennsylvania ⁴					1.00	"
Rhode Island.....					2.00	"
Washington ⁵					1.00	"

No registration of operators: Kansas, Mississippi, Nebraska, Nevada, New Mexico, North Carolina, North Dakota, Ohio, Oklahoma, South Carolina, South Dakota, Tennessee, Wisconsin, and Wyoming.

¹ Half fee for last half year.

² Motorcycle also required—\$1.00 annually.

³ Motorcycle also required—\$1.00 perpetual.

⁴ Traction engine license also required—\$2.00 annually.

⁵ Half fee after August 1 for paid operators.

⁶ Renewals biennially.

TAXATION OF MOTOR VEHICLES

149

APPENDIX 5—GASOLINE TAXES, 1923 (From April 1924, issue of *Public Roads*)

State	Total Gross Receipts	Amount Applicable to Highway Work by or under Supervision of State Highway Department	Tax in Cents Per Gallon on Jan. 1, 1923	Tax in Cents Per Gallon on Jan. 1, 1924	Date on Which Change in Rate of Tax Became Effective	State	Total Gross Receipts	Amount Applicable to Highway Work by or under Supervision of State Highway Department	Tax in Cents Per Gallon on Jan. 1, 1923	Tax in Cents Per Gallon on Jan. 1, 1924	Date on Which Change in Rate of Tax Became Effective
Alabama	\$1,133,085.49	\$118,530.76	2	2	Mar. 1	Nevada	\$115,843.24	\$80,000.00	..	2	Mar. 20
Arizona	474,123.04	201,094.76	1	3	June 9	New Hampshire	163,064.64	161,823.10	..	2	Jan. 1, 1924
Arkansas	1,219,198.75	1,259,446.00	1	4	Jan. 1, 1924	New Jersey	165,000.00	156,750.00	1	1	..
California	2,518,893.00	402,017.73	2	2	Sept. 30	New Mexico	2,800,804.74	2,900,000.00	1	3	Apr. 1
Colorado	846,353.12	880,222.70	1	1	Aug. 1	New York	461,081.71	..	1	1	..
Connecticut	880,222.70	88,579.28	1	2	Jan. 1, 1924	North Carolina	590,000.00	599,000.00	..	1	July 1
Delaware	88,579.28	1,150,355.99	1	3	July 1	Ohio	1,938,141.37	1,885,421.15	2	3	May 24
District of Columbia	1,641,042.25	247,666.55	1	1	Oct. 1	Oregon	5,490,522.66	..	1	2	July 1
Florida	1,502,503.49	396,487.18	1	2	Apr. 1	Pennsylvania	1,511,452.56	411,327.78	2	3	Mar. 23
Georgia	1,502,503.49	396,487.18	1	2	Apr. 1	Rhode Island	624,692.44	756,000.00	1	2	Apr. 1
Idaho	396,487.18	2,514,755.83	2	2	June 1	South Carolina	812,356.68	801,502.36	..	2	June 15
Illinois	2,906,428.25	680,435.30	1	1	..	South Dakota	1,215,623.36	914,717.32	..	2	Mar. 8
Iowa	..	734,437.85	1	1	..	Texas	1,215,623.36	914,717.32	..	2	..
Kansas	680,435.30	283,859.84	1	1	..	Tennessee	168,172.81	168,172.81	..	1	..
Kentucky	734,437.85	688,504.02	1	2	July 7, 1924	Utah	1,556,922.90	1,037,947.32	1	3	Apr. 27
Louisiana	283,859.84	..	1	2	Jan. 1, 1924	Vermont	1,225,149.66	366,490.00	1	2	June 1, 1924
Maine	688,504.02	..	..	..	..	Washington	366,490.00	..	..	2	July 27
Maryland	..	187,142.21	1	1	..	West Virginia	140,161.62	..	..	1	Mar. 1
Massachusetts	..	467,855.53	1	2	..	Wyoming	..	..	..	..	..
Michigan	..	75,877.10	1	2	..	Total	\$36,813,939.61	\$21,598,559.18	..	..	..
Minnesota	441,249.10	..	..	..	..		
Mississippi	..	..	..	..	..	
Missouri	..	..	..	..	..	
Montana	..	..	..	..	..	
Nebraska	..	..	..	..	..	

¹ One cent from Jan. 1 to Apr. 1; 3 cents Apr. 1 to Dec. 31, inclusive.

² One cent from Apr. 22 to Dec. 31, inclusive.

³ Act passed by legislature, but referendum invoked. Election November, 1924.

⁴ Constitutional amendment permitting a tax on gasoline to be voted on November, 1924.

⁵ To Dec. 1, 1923.

⁶ Tax of 1 cent per gallon effective July 1 to Dec. 31, inclusive.

⁷ Approximate.

⁸ One-third of total receipts returned to counties for county highway work. Collections from July 27, when tax became effective, to Nov. 1.

APPENDIX 6—TOTAL MOTOR VEHICLE LICENSE FEES, YEARLY REGISTRATIONS, AND AVERAGE RECEIPTS PER VEHICLE, 1901-1923¹

Year	Number of Vehicles Registered	Total Gross Receipts ¹	
		Amount	Average per Vehicle
1901.....	.....	\$954	....
1902.....	.....	1,082	....
1903.....	.....	26,865	....
1904.....	.....	33,411	....
1905.....	.....	62,500	....
1906.....	.....	192,706	....
1907.....	.....	334,916	....
1908.....	.....	484,277	....
1909.....	294,000	938,860	\$3.20
1910.....	472,700	2,227,434	4.70
1911.....	677,000	3,967,475	5.85
1912.....	1,010,399	5,638,878	5.60
1913.....	1,258,062	8,192,253	6.50
1914.....	1,711,339	12,382,031	7.20
1915.....	2,445,666	18,245,711	7.45
1916.....	3,512,996	25,865,369	7.35
1917.....	4,983,340	37,501,233	7.55
1918.....	6,146,617	51,477,419	8.35
1919.....	7,566,446	64,697,255	8.55
1920.....	9,231,941	102,546,212	11.10
1921.....	10,463,295	122,478,654	11.70
1922.....	12,238,375	152,047,823	12.50
1923.....	15,092,177	188,970,992	12.50
Total.....	.....	798,314,310	....

CLASSIFICATION OF STATES ACCORDING TO AVERAGE MOTOR VEHICLE REVENUES PER VEHICLE

Average Revenues per Vehicle	Number of States in Each Class ¹										
	1913	1914 ²	1915	1916	1917	1918	1919	1920	1921	1922	1923
\$4.90 and less.....	21	17	13	14	14	6	7	2	1	..	1
\$5-\$9.90.....	15	17	20	21	22	27	24	17	15	15	15
\$10-\$14.90.....	9	11	12	11	10	9	10	18	21	17	16
\$15-\$19.90.....	4	3	3	3	3	6	7	10	11	14	13
\$20-\$24.90.....	..	..	..	..	..	1	1	2	1	1	3
\$25-\$29.90.....	..	..	..	..	..	..	..	..	..	2	1
\$30-\$34.90.....	..	..	1	..	..	..	..	..	..	..	..
Total.....	49	48	49	49	49	49	49	49	49	49	49

¹ Includes District of Columbia.

² These receipts do not include any gasoline taxes.

³ On account of the Supreme Court declaring the licensing law unconstitutional, no revenues were reported for Michigan.

—(From *Public Roads*, Vol. 5, No. 7, September 1924, Motor Vehicle Fees and Gasoline Taxes by Henry R. Trumbower, Economist, U. S. Bureau of Public Roads)

TAXATION OF MOTOR VEHICLES

151

APPENDIX 7—SUMMARY OF COMBINED PASSENGER CAR AND MOTOR TRUCK REGISTRATIONS FOR YEARS 1913 TO 1923, INCLUSIVE
(From April, 1924, issue of *Public Roads*)

State	1913	1914	1915	1916	1917	1918	1919	1920	1921	1922	1923
Alabama.....	5,300	8,672	11,634	21,636	32,873	46,171	58,898	74,637	82,360	90,052	126,642
Arizona.....	3,613	5,040	7,753	12,300	19,860	23,905	28,979	35,611	35,611	38,404	49,175
Arkansas.....	3,583	5,642	8,021	15,000	28,693	41,458	49,450	59,082	67,408	84,596	113,300
California.....	100,000	123,504	163,797	232,440	306,916	407,761	477,450	583,623	680,614	861,807	1,100,283
Colorado.....	13,000	17,756	28,894	43,206	87,460	83,244	104,865	129,255	145,739	162,328	188,956
Connecticut.....	23,200	27,786	41,121	56,048	74,645	86,067	102,410	119,134	134,141	152,977	181,748
Delaware.....	2,440	3,050	5,052	7,102	10,700	12,955	16,152	18,300	21,413	24,560	29,977
District of Columbia.....											
Florida.....	4,000	4,833	8,009	13,118	15,493	30,490	35,400	34,161	40,625	52,792	74,811
Georgia.....	3,000	3,368	8,009	20,718	27,000	54,186	55,400	73,914	97,957	116,170	151,990
Idaho.....	2,000	20,915	25,000	46,025	70,324	104,576	137,000	146,000	131,976	143,423	173,889
Illinois.....	2,113	3,346	7,071	12,999	24,731	32,289	42,229	50,861	51,294	53,574	62,379
Indiana.....	94,656	131,140	180,832	238,429	340,292	389,020	478,438	568,924	663,345	781,974	969,331
Iowa.....	45,000	66,500	96,915	139,065	192,194	227,160	227,235	333,067	400,322	466,959	576,532
Kansas.....	70,299	106,087	143,109	198,587	254,462	278,313	364,043	437,378	463,684	560,168	671,161
Kentucky.....	34,550	49,374	72,520	112,122	156,343	189,163	228,600	294,159	286,039	327,194	376,694
Louisiana.....	7,210	11,766	19,500	31,500	47,420	65,884	90,008	112,683	126,802	154,021	198,377
Maine.....	10,000	12,000	11,380	17,000	24,394	40,000	51,000	73,000	77,885	102,284	136,622
Maryland.....	11,227	13,600	21,545	30,972	41,499	44,572	53,425	62,907	77,527	92,539	108,600
Massachusetts.....	62,660	77,246	102,633	136,809	174,274	219,666	247,182	302,841	336,249	385,231	481,150
Michigan.....	54,366	76,389	114,845	180,052	247,006	262,125	325,813	412,717	476,452	578,210	730,658
Minnesota.....	46,000	67,862	93,269	146,000	259,741	294,458	259,741	324,166	323,475	380,557	448,187
Mississippi.....	3,850	5,694	9,669	25,000	36,600	48,400	59,000	68,486	65,039	77,571	104,286
Missouri.....	38,140	54,468	76,462	103,587	147,528	188,040	244,363	297,008	346,437	392,523	476,598
Montana.....	5,916	10,200	14,540	25,105	42,749	51,053	59,324	60,650	58,785	62,050	73,828
Nebraska.....	13,411	16,385	59,000	101,200	148,101	173,374	200,000	219,000	238,704	256,654	286,053
Nevada.....	1,091	1,487	2,009	4,910	7,160	8,159	9,305	10,464	10,821	12,116	15,699
New Hampshire.....	8,237	9,571	13,449	17,508	22,267	24,817	31,625	34,680	42,039	48,406	59,604
New Jersey.....	51,360	62,961	81,848	100,414	141,918	155,519	190,873	227,737	272,994	342,286	430,958
New Mexico.....	1,898	3,090	5,100	8,228	14,086	17,647	18,082	22,100	22,559	25,473	32,032
New York.....	134,495	168,223	255,242	314,222	406,016	459,288	566,511	676,205	812,031	1,002,293	1,204,213
North Carolina.....	10,000	14,677	21,000	33,904	55,950	72,313	109,017	140,860	148,627	182,550	246,812
North Dakota.....	15,187	17,347	24,908	40,446	62,993	71,678	82,885	90,840	92,644	99,052	109,266
Ohio.....	86,156	122,504	181,332	252,431	346,772	412,775	511,031	621,390	720,634	858,716	1,069,100
Oklahoma.....	3,000	13,500	25,032	52,718	100,199	121,500	144,500	212,880	221,300	249,659	307,000

APPENDIX 7—SUMMARY OF COMBINED PASSENGER CAR AND MOTOR TRUCK REGISTRATIONS FOR YEARS 1913 TO 1923, INCLUSIVE—Continued
(From April, 1924, issue of *Public Roads*)

State	1913	1914	1915	1916	1917	1918	1919	1920	1921	1922	1923
Oregon.....	13,975	16,447	23,585	33,917	45,632	63,324	83,332	103,790	118,198	134,125	165,962
Pennsylvania.....	80,178	112,854	160,137	230,578	325,153	394,186	482,117	570,164	689,589	829,737	1,043,770
Rhode Island.....	10,295	12,331	16,362	21,406	37,046	36,218	44,833	50,477	54,608	66,083	76,312
South Carolina.....	10,000	14,000	13,000	125,000	38,332	55,492	70,143	83,843	86,836	95,239	127,407
South Dakota.....	14,457	20,929	28,724	44,271	67,158	90,521	104,628	120,395	119,274	125,241	131,700
Tennessee.....	10,000	19,769	77,618	130,000	148,000	163,000	80,422	101,852	117,025	135,716	173,365
Texas.....	132,000	140,000	140,000	1125,000	192,961	251,118	331,310	427,693	467,616	526,238	688,233
Utah.....	4,000	2,253	9,177	13,507	24,076	32,273	35,236	42,616	47,485	49,164	59,525
Vermont.....	5,913	8,475	11,499	15,671	21,633	22,553	26,807	31,625	37,265	43,881	52,776
Virginia.....	9,022	13,984	21,357	35,426	55,661	72,228	94,100	115,470	139,200	168,000	218,596
Washington.....	24,178	30,253	38,823	50,734	91,337	117,278	148,775	173,920	183,350	210,716	258,364
West Virginia.....	6,144	6,189	13,279	20,571	31,300	38,750	50,203	60,664	93,940	112,763	157,924
Wisconsin.....	34,346	53,161	77,741	115,613	158,637	196,253	236,280	293,298	341,841	382,542	457,271
Wyoming.....	1,584	2,428	3,976	7,123	12,523	16,200	21,371	23,926	26,866	30,637	39,551
Total.....	1,258,062	1,711,339	2,445,666	3,512,990	4,983,340	6,146,617	7,565,446	9,231,941	10,463,295	12,238,375	15,092,177

¹ Estimated.

² Includes reregistrations, but does not include nonresident registrations.

³ State registrations only.

⁴ Cars registered during 1916 only; total in State, approximately 138,000.

⁵ Cars registered during 1917 only; total, approximately 160,000.

⁶ Total cumulative registrations; annual registration not required.

⁷ Cars registered during 1915 only; total, approximately 26,000.

TAXATION OF MOTOR VEHICLES

153

APPENDIX 8—SUMMARY OF TOTAL GROSS RECEIPTS FROM MOTOR VEHICLE REGISTRATION FEES, LICENSES, AND PERMITS, ETC., FOR YEARS 1919 TO 1923
(From April, 1924, issue of *Public Roads*)

State	1913	1914	1915	1916	1917	1918	1919	1920	1921	1922	1923
Alabama.....	\$83,000	\$113,202	\$190,744	\$203,655	\$217,700	\$470,274	\$541,348.70	\$535,175.00	\$1,147,265.00	\$1,262,800.00	\$1,541,017.55
Arizona.....	27,545	34,077	45,579	73,000	117,643	142,288	164,755.85	192,388.92	185,989.75	216,598.26	281,670.75
Arkansas.....	17,411	56,420	80,551	150,000	205,176	410,649	501,970.00	591,464.50	856,543.60	1,030,106.60	1,435,090.00
California.....	75,000	1,338,785	2,027,432	2,192,699	2,846,030	3,524,036	4,468,717.40	5,714,717.40	6,834,089.52	8,334,089.40	10,608,544.00
Colorado.....	80,833	80,047	120,801	197,765	296,808	379,559	490,432.31	819,872.74	906,059.27	991,677.22	1,136,218.55
Connecticut.....	316,667	406,623	536,970	768,728	1,080,757	1,285,164	1,516,136.91	1,852,591.00	2,120,861.12	2,567,744.84	4,229,432.16
Delaware.....	24,735	35,672	55,596	83,249	133,883	232,449	286,333.00	329,980.00	375,469.00	426,377.00	516,209.00
District of Columbia.....	13,228	20,147	29,396	47,624	55,928	220,753	274,184.00	266,285.00	209,583.00	383,726.50	387,918.00
Florida.....	* 6,000	* 6,736	60,000	127,176	* 170,000	345,775	401,317.40	554,693.14	734,845.50	1,538,342.26	1,963,065.99
Georgia.....	12,000	104,575	125,000	154,735	229,053	331,816	429,848.00	1,919,238.92	1,705,941.24	1,830,047.61	2,156,406.08
Idaho.....	35,160	58,850	121,259	213,758	412,641	576,555	729,702.94	882,034.51	841,212.93	812,943.72	914,014.58
Illinois.....	507,629	699,725	924,906	1,226,566	1,388,835	2,764,330	3,262,714.00	5,915,700.17	6,303,556.21	7,882,482.02	9,083,796.04
Indiana.....	150,345	432,309	887,318	817,268	1,096,159	1,293,128	1,588,740.50	2,029,694.00	2,422,227.00	2,999,588.50	3,693,715.00
Iowa.....	787,411	1,040,136	1,533,054	1,776,170	2,249,655	2,547,596	3,077,445.51	7,507,202.08	7,719,127.47	7,923,388.06	8,897,062.99
Kansas.....	186,066	268,471	387,258	558,762	830,878	978,837	1,150,000.00	1,419,345.50	1,400,000.00	3,100,000.00	3,435,606.00
Kentucky.....	52,000	85,853	117,117	184,741	287,314	402,250	565,320.21	815,540.31	1,771,887.02	2,140,444.31	2,678,732.89
Louisiana.....	* 10,000	* 12,000	75,600	112,000	166,835	240,000	306,000.00	390,000.00	453,276.00	1,756,226.42	2,191,240.81
Maine.....	135,509	192,542	268,412	363,562	491,696	570,171	685,570.25	818,735.50	1,004,750.25	1,417,507.57	1,660,268.17
Maryland.....	150,000	268,231	394,565	545,302	807,395	1,189,984	1,776,410.22	2,124,924.84	2,460,163.04	2,824,843.91	3,538,935.20
Massachusetts.....	764,154	923,961	1,335,724	1,602,995	1,969,994	2,184,821	2,667,553.55	3,960,231.70	4,717,389.30	5,685,527.05	6,989,633.25
Michigan.....	190,379	(4)	373,533	1,739,344	2,471,271	2,875,266	3,719,433.39	5,754,900.96	6,751,924.51	8,383,022.17	10,500,786.05
Minnesota.....	40,000	132,398	* 160,540	82,469	100,000	1,076,511	218,469.50	143,794.50	5,672,424.61	6,543,685.77	7,316,772.03
Mississippi.....	24,735	51,146	76,700	175,000	250,000	335,000	400,000.00	800,000.00	1,179,946.63	1,179,803.00	1,077,616.22
Missouri.....	173,510	235,873	323,289	439,315	617,942	1,394,762	1,725,076.70	2,111,696.55	2,505,333.90	3,512,182.97	4,016,383.60
Montana.....	12,000	27,000	32,120	52,768	590,986	350,914	407,848.00	416,245.00	594,520.50	619,899.50	729,621.50

APPENDIX 8—SUMMARY OF TOTAL GROSS RECEIPTS FROM MOTOR VEHICLE REGISTRATION FEES, LICENSES, AND PERMITS, ETC., FOR YEARS
1913 TO 1923—Continued

(From April, 1924, issue of *Public Roads*)

State	1913	1914	1915	1916	1917	1918	1919	1920	1921	1922	1923
Nebraska.....	26,000	34,325	* 183,000	311,334	451,303	536,897	804,450.55	2,300,000.00	2,824,811.25	3,031,699.93	3,333,175.32
Nevada.....	3,323	4,331	7,875	20,116	31,166	31,083	37,550.75	103,318.33	102,800.00	120,937.73	153,888.10
New Hampshire.....	182,834	155,288	257,776	344,434	425,305	509,335	699,621.25	654,702.04	876,322.14	1,246,098.46	1,571,326.06
New Jersey.....	691,446	814,536	1,062,923	1,406,806	1,923,164	2,431,757	2,931,902.15	3,400,930.76	3,974,063.75	6,251,418.50	7,633,780.37
New Mexico.....	15,084	19,063	29,925	47,865	80,843	105,631	111,150.00	200,000.00	198,632.77	243,813.61	295,000.00
New York.....	1,275,727	1,529,852	1,991,181	2,455,042	4,284,144	4,945,298	5,984,659.50	8,863,250.59	10,288,838.25	12,736,364.37	19,802,441.82
North Carolina.....	60,000	89,580	123,070	206,101	321,923	394,739	1,313,950.73	1,785,000.00	2,259,240.43	2,715,331.58	3,728,044.72
North Dakota.....	41,961	55,964	79,245	122,283	211,536	471,429	636,842.40	691,500.00	683,052.45	698,931.70	760,832.45
Ohio.....	437,538	685,457	984,622	1,263,405	1,766,427	2,125,426	2,593,000.00	6,400,000.00	6,894,159.73	7,888,992.38	9,662,370.29
Oklahoma.....	3,000	13,500	154,592	355,011	853,659	1,102,380	1,178,130.27	2,500,000.00	2,619,713.49	2,729,169.15	3,217,770.84
Oregon.....	56,573	77,592	108,581	146,232	196,787	461,422	602,239.00	2,085,168.50	2,234,931.25	3,340,519.58	4,009,609.40
Pennsylvania.....	841,062	1,185,039	1,665,276	2,225,057	3,208,025	4,048,156	5,090,921.00	8,090,873.04	9,470,174.31	12,575,380.56	15,844,303.80
Rhode Island.....	129,851	157,020	206,440	284,737	346,117	477,223.25	531,462.75	831,462.75	848,723.59	1,139,742.77	1,296,659.47
South Carolina.....	10,000	14,000	15,000	10,000	113,557	300,217	359,034.68	827,868.13	741,114.79	734,856.18	902,608.49
South Dakota.....	89,170	125,000	* 180,000	140,746	210,592	282,742	322,340.50	784,000.00	720,587.00	743,232.00	1,130,959.37
Tennessee.....	* 9,000	39,538	* 34,000	186,953	322,200	390,000	585,181.95	1,215,776.04	1,387,870.10	1,592,230.14	2,049,653.27
Texas.....	16,000	20,000	20,000	20,000	858,978	2,039,589	2,694,334.29	3,510,355.97	3,806,395.25	4,261,488.67	5,441,508.59
Utah.....	3,000	4,852	* 60,000	93,494	176,707	229,203	291,325.90	359,933.29	441,359.88	729,455.00	430,104.72
Vermont.....	111,460	154,267	218,480	297,992	363,541	398,856	460,190.87	555,422.38	668,288.50	781,982.35	938,560.30
Virginia.....	83,611	120,814	176,875	271,266	518,566	684,636	900,000.00	1,822,736.16	2,021,146.09	2,467,346.93	3,200,161.66
Washington.....	48,356	60,506	238,717	350,052	519,526	875,391	2,325,323.53	2,828,896.10	3,140,730.74	3,291,671.70	3,898,597.77
West Virginia.....	40,000	60,648	128,952	198,436	359,339	447,705	1,008,083.31	1,280,193.28	1,250,525.82	1,936,079.29	2,698,508.37
Wisconsin.....	190,770	293,580	431,977	615,721	861,278	2,076,701	2,592,832.00	3,127,073.00	3,671,645.50	4,088,570.00	4,938,933.55
Wyoming.....	7,920	12,140	19,880	35,625	57,421	80,000	102,114.50	267,179.35	288,121.88	316,849.50	414,096.39
Total.....	\$8,192,253	\$12,352,031	\$18,245,711	\$25,865,569	\$37,501,233	\$51,477,419	\$64,697,255.48	\$102,546,212.25	\$122,478,654.33	\$152,047,823.74	\$188,970,992.24

1 Approximate.

* State registrations only.

* Estimated.

* Registration law held unconstitutional.

APPENDIX 9—PERSONS PER REGISTERED CAR, 1919-1923

State	1919	1920	1921	1922	1923	State	1919	1920	1921	1922	1923
Alabama.....	41.2	31.5	28.5	26.1	19.1	Nebraska.....	6.5	5.9	5.4	5.1	4.7
Arizona.....	9.6	9.6	9.5	8.8	7.7	Nevada.....	12.8	7.4	7.2	6.4	4.9
Arkansas.....	36.8	29.6	25.9	20.4	16.0	New Hampshire.....	14.1	12.8	10.5	9.2	7.5
California.....	6.1	6.0	5.2	3.8	3.4	New Jersey.....	14.5	13.9	11.6	9.2	7.8
Colorado.....	10.0	7.3	6.4	5.8	5.3	New Mexico.....	24.9	16.3	15.9	14.1	11.6
Connecticut.....	12.8	11.6	10.4	9.0	8.1	New York.....	19.1	15.5	13.3	10.4	9.0
Delaware.....	13.1	12.2	10.4	9.1	7.7	North Carolina.....	22.9	18.2	17.2	14.0	10.9
District of Columbia.....	10.7	12.8	10.8	8.3	6.4	North Dakota.....	9.8	7.1	6.9	6.5	6.1
Florida.....	17.2	13.1	9.9	8.3	6.9	Ohio.....	10.4	9.3	7.9	6.8	5.7
Georgia.....	21.7	19.8	21.9	20.2	17.3	Oklahoma.....	17.1	9.5	9.2	8.1	6.9
Idaho.....	11.3	8.5	8.4	8.0	7.4	Oregon.....	10.9	7.6	6.6	5.8	5.0
Illinois.....	13.4	11.4	9.7	8.3	7.0	Pennsylvania.....	18.3	15.3	12.6	10.5	8.7
Indiana.....	12.6	8.8	7.3	6.2	5.2	Rhode Island.....	16.4	12.0	11.3	9.1	8.2
Iowa.....	6.1	5.5	5.2	4.8	4.3	South Carolina.....	21.2	17.9	18.7	17.7	13.7
Kansas.....	8.3	6.0	6.1	5.4	4.8	South Dakota.....	7.2	5.3	5.3	5.1	5.0
Kentucky.....	26.9	21.4	19.0	15.7	12.3	Tennessee.....	20.1	23.0	19.9	17.2	13.8
Louisiana.....	37.5	24.6	23.1	17.6	13.5	Texas.....	14.1	10.9	9.9	8.9	7.2
Maine.....	14.8	12.2	9.9	8.3	7.2	Utah.....	13.1	10.5	8.9	9.1	8.0
Maryland.....	16.7	14.1	10.6	8.8	8.9	Vermont.....	13.7	11.1	9.4	8.0	6.7
Massachusetts.....	15.7	14.0	10.7	10.0	8.4	Virginia.....	24.0	20.0	16.5	13.8	11.4
Michigan.....	9.7	8.9	7.7	6.3	5.4	Washington.....	11.5	7.8	7.3	6.5	5.5
Minnesota.....	9.1	7.4	7.4	6.3	5.6	West Virginia.....	29.2	18.1	15.6	12.9	9.9
Mississippi.....	45.0	26.1	27.5	23.1	17.1	Wisconsin.....	10.9	9.0	7.7	6.9	6.1
Missouri.....	14.2	10.5	9.8	8.7	7.2	Wyoming.....	9.1	8.1	7.2	6.3	5.3
Montana.....	8.4	9.0	9.3	8.8	8.3						
						Total.....	14.1	11.5	10.4	8.6	7.3

* Registration law held unconstitutional.

* Estimated.

* Registration only.

APPENDIX 10—AVERAGE LICENSE FEES FOR 1½-TON, 3½-TON, AND 5-TON TRUCKS¹

Capacity of Truck	1914	1921	1924
1½ tons.....	\$6.43	\$27.55	\$31.15
3½ tons.....	8.36	64.05	85.75
5 tons.....	8.80	96.52	130.30

NUMBER OF STATES CHARGING VARIOUS AVERAGE LICENSE FEES FOR THREE SIZES OF MOTOR TRUCKS, 1914, 1921, AND 1924

Average Fees	1½-ton			3½-ton			5-ton		
	1914	1921	1924	1914	1921	1924	1914	1921	1924
Less than \$10.....	33	4	..	29	2	..	29	2	..
\$10-\$19.....	12	7	8	12	3	..	11	3	..
\$20-\$29.....	1	17	20	4	3	2	4	2	1
\$30-\$39.....	..	9	8	1	4	3	2	1	..
\$40-\$49.....	..	7	4	..	6	7	..	3	4
\$50-\$59.....	..	3	5	..	6	4	..	5	6
\$60-\$69.....	..	1	1	..	5	4	..	3	2
\$70-\$79.....	1	..	2	5	..	4	4
\$80-\$89.....	3	3	..	3	3
\$90-\$99.....	1	..	4	2	..	1	..
\$100-\$109.....	8	8	..	3	2
\$110-\$119.....	1	1	..	1	1
\$120-\$129.....	1	2	..	2	3
\$130-\$139.....	1	..	..	..
\$140-\$149.....	3	..	3	4
\$150-\$159.....	4	7
\$160-\$169.....
\$170-\$179.....	1	..	1	..
\$180-\$189.....	2	3
\$190-\$199.....
\$200-\$209.....	1	1	..	4	3
\$210-\$219.....
\$220-\$229.....	1	..	..	..
\$230-\$239.....	1
\$240-\$249.....
\$250-\$259.....
\$260-\$269.....
\$270-\$279.....
\$280-\$289.....
\$290-\$299.....
\$300-\$309.....	1	3
\$310-\$319.....
\$320-\$329.....
\$330-\$339.....
\$340-\$349.....
\$350-\$359.....
\$360-\$369.....
\$370-\$379.....
\$380-\$389.....
\$390-\$399.....
\$400-\$499.....	1
Total.....	46	48	48	46	48	48	46	48	48

—(From *Public Roads*, Vol. 5, No. 7, September 1924, "Motor Vehicle Fees and Gasoline Taxes" by Henry R. Trumbower, Economist, U. S. Bureau of Public Roads)

APPENDIX 11—LICENSE FEES AND GASOLINE TAXES PER VEHICLE-MILE BASED ON AVERAGE TRAVEL OF 6,000 MILES, 1923

State	Average License Fee per Vehicle-Mile	Average Gasoline Tax per Vehicle-Mile ¹	Com- bined Taxes per Vehicle-Mile
	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>
Alabama.....	0.203	0.149	0.352
Arizona.....	.095	.160	.255
Arkansas.....	.211	.179	.390
California.....	.160	.038	.198
Colorado.....	.099	.075	.174
Connecticut.....	.397	.081	.478
Delaware.....	.287	.049	.336
District of Columbia.....	.080	....	.080
Florida.....	.215	.180	.395
Georgia.....	.207	.144	.351
Idaho.....	.244	.106	.350
Illinois.....	.167	....	.167
Indiana.....	.105	.083	.188
Iowa.....	.258	....	.258
Kansas.....	.152	....	.152
Kentucky.....	.225	.057	.282
Louisiana.....	.267	.092	.359
Maine.....	.255	.044	.299
Maryland.....	.348	.068	.416
Massachusetts.....	.242	....	.242
Michigan.....	.239	....	.239
Minnesota.....	.272	....	.272
Mississippi.....	.172	.075	.247
Missouri.....	.140	....	.140
Montana.....	.165	.100	.265
Nebraska.....	.195	....	.195
Nevada.....	.163	.123	.286
New Hampshire.....	.439	.046	.485
New Jersey.....	.296	....	.296
New Mexico.....	.153	.086	.239
New York.....	.274	....	.274
North Carolina.....	.252	.196	.448
North Dakota.....	.116	.070	.186
Ohio.....	.151	....	.151
Oklahoma.....	.175	.033	.208
Oregon.....	.408	.196	.604
Pennsylvania.....	.253	.088	.341
Rhode Island.....	.281	....	.281
South Carolina.....	.118	.198	.316
South Dakota.....	.143	.079	.222
Tennessee.....	.197	.078	.275
Texas.....	.132	.029	.161
Utah.....	.120	.113	.233
Vermont.....	.296	.053	.349
Virginia.....	.244	.118	.362
Washington.....	.252	.079	.331
West Virginia.....	.276	.039	.315
Wisconsin.....	.181	....	.181
Wyoming.....	.173	.059	.232
Average.....	.208	.041	.249

Toll per vehicle-mile on 187.5 miles of turnpike in Maryland and Virginia, 2.7 cents.

¹ A number of the figures in this column are based on collections of gasoline taxes for less than one year. (See *Public Roads*, Vol. 5, No. 2, April, 1924, p. 17.)

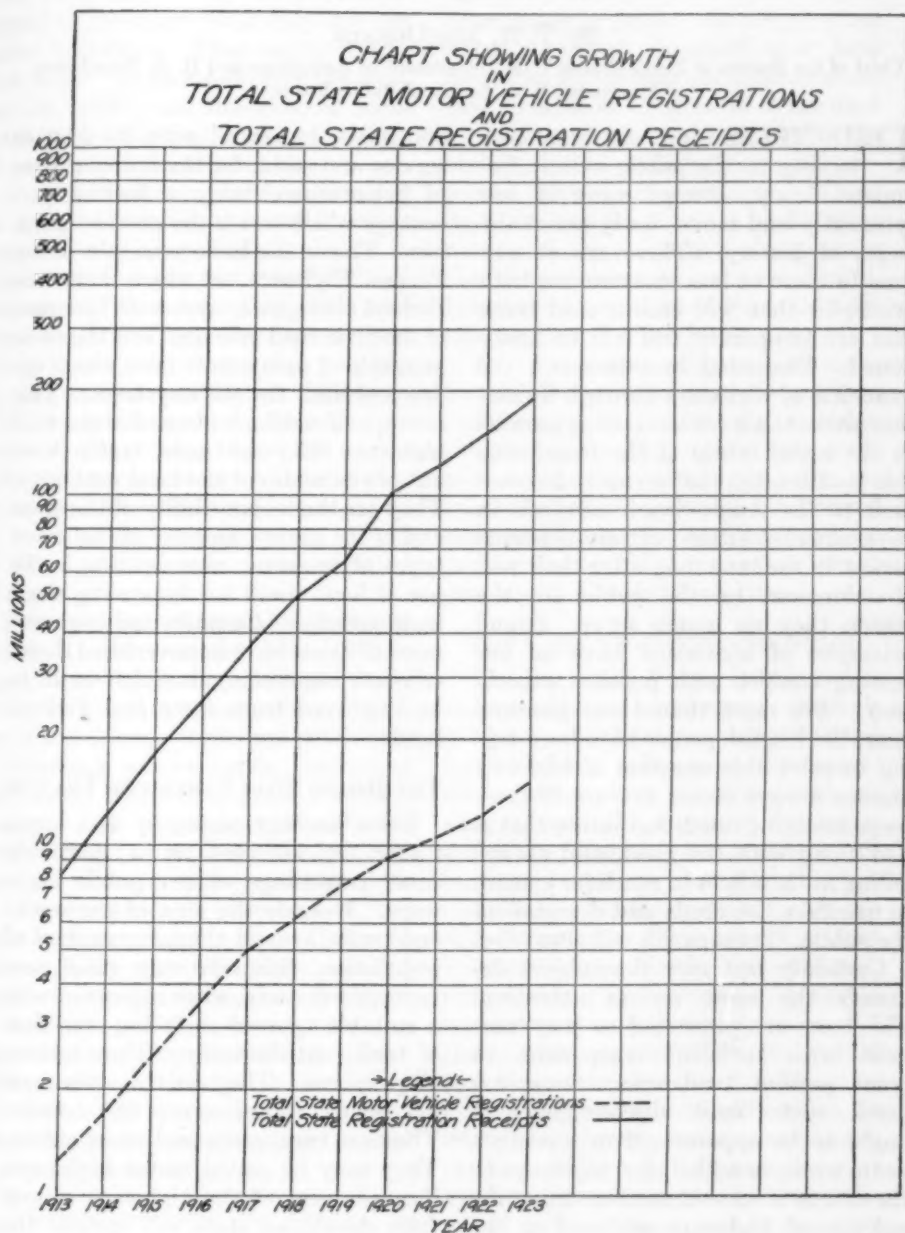
—(From *Public Roads*, Vol. 5, No. 7, September 1924, "Motor Vehicle Fees and Gasoline Taxes" by Henry R. Trumbower, Economist, U. S. Bureau of Public Roads)

APPENDIX 12—GROWTH IN REGISTRATIONS AND REVENUES, IN RELATION TO POPULATION

	1913	1914	1915	1916	1917	1918	1919	1920	1921	1922	1923
Total motor vehicle registrations—U. S. A.	1,258,062	1,711,339	2,445,666	3,512,996	4,983,340	6,146,617	7,566,446	9,231,941	10,463,295	12,238,375	15,092,177
Total population—U. S. A.	96,512,407	97,927,516	99,342,625	100,757,735	102,172,845	103,587,955	105,003,065	106,418,175	107,833,284	109,248,393	110,663,502
Population per registration	76.7	57.2	40.6	28.7	20.5	16.8	13.8	11.5	10.3	8.9	7.3
Revenue:											
State registrations.....	\$8,192,253	\$12,382,031	\$18,245,711	\$25,805,369	\$37,501,233	\$51,477,419	\$64,697,255	\$102,546,212	\$122,478,654	\$152,047,823	\$188,970,992
Federal excise taxes....							92,360,828	149,207,519	99,967,422	114,793,400	157,707,255
Total.....							\$157,058,083	\$251,753,731	\$222,446,076	\$266,841,223	\$346,678,247
Revenue per vehicle registered:											
State-registration fees	\$6.51	\$7.23	\$7.46	\$7.36	\$7.52	\$8.37	\$8.56	\$11.10	\$11.70	\$12.42	\$12.52
Revenue per capita:											
State registrations....	\$.084	\$.126	\$.183	\$.256	\$.357	\$.496	\$.616	\$.958	\$ 1.134	\$ 1.391	\$ 1.707
Federal excise taxes....							.879	1.402	.927	1.050	1.425
Total.....							\$1.495	\$2.360	\$2.061	\$2.441	\$3.132

¹ Gasoline taxes where levied add approximately \$4.50 per car registered for each 1 cent of tax.

² Gasoline taxes totalling \$36,513,940 in 1923 in 35 states add approximately 30 cents per capita on basis of entire U. S. A. population, or 60 cents per capita average in the states where it was levied.



The Financing of Highways

By T. H. MACDONALD

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PRINCIPLES and concepts pertaining to the public welfare formulate slowly, change more or less constantly and move slowly across the pages of history. There are at any time in more or less common use both principles that will endure and those that are temporary and will be abandoned. Examined in retrospect, the financing of highways through legislation presents a most interesting parallel to the social fabric of the time, with this modification that seems to be common to the Anglo-Saxon methods in governmental affairs: certain concepts persist in the laws long after their real abandonment by the public for the reason they no longer serve. Sound principles of legislation have an unceasing conflict with political expediency. For more than three hundred years the English people have been trying to solve this question of highway finance always facing this conflict, always retaining much legislation that is bad along with the good, and always failing in their laws to reach far enough to overtake the needs and demands of the public. Perhaps this will always be.

Certainly just now the subject demands the most serious attention. The facts are presented as they now exist with sufficient comparison to point present tendencies. Some are good, some most discouraging. It ought to be apparent, if in seventeen years we have added new highways to the extent of more than three times the mileage of highways surfaced in the same period, that as a nation we are "tilting with wind mills" unless we classify the tremendous mileage, 2,941,-

000 miles, in accord with its relative service and select for the better classes of improvement only a limited percentage which serves the greatest number. This is the basic principle of the Federal Highway Act which limits the Federal aid highway system to 7 per cent of the total road mileage. It is the basic principle of many state laws which define and limit the state systems. This concept of nation-wide and state-wide highways lifts the main traffic lines out of the realm of the local authority. They are the responsibility of the state and of the nation, and one of the worst types of financing now existing is the use of local funds for improving these main arteries. Counties and improvement districts have impoverished themselves to improve roads which ought to be improved from state and Federal funds.

THE ROADS THAT SERVE THE TRAFFIC

From another angle, by and large, traffic concentrates on a relatively small percentage of our public highways. Outside the area of the week-end traffic around the large centers of population, this relatively small percentage will carry, when improved with a suitable type of surfacing, the flow of traffic satisfactorily. They answer all purposes. They are the main market roads. They serve the tourist. They are trans-state and trans-nation. They may be called motor highways. Ten per cent of the highways of any fully developed state will include the most important, and 20 per cent will reach about all that will, for a long period, have any claim upon the title

of motor highway. Because tributary roads have a few motor vehicles operated over them from the few farms served to the main road, they are not motor highways. They are not traffic flow lines. These roads serve the land, not the traffic, and this class of highways at this time aggregates probably 80 per cent of the total mileage.

If, as the evidence plainly points, the tendency is to make the road user pay progressively increasing charges in license fees and gas taxes for road improvement, then certainly such revenues ought to be concentrated upon those roads which can be properly classed as motor highways. Further, with the great demands for improved roads of more than 15,000,000 motor vehicles now operating, all of the revenues from the motor vehicle ought to be used for highway purposes. Both of these principles are being violated in numerous states.

Perhaps one other major principle ought to be recorded here. While there have been large additions made annually to the mileage of surfaced roads and other betterments in the way of widening narrow roads, improving alignment, eliminating grade crossings and such, the factor that probably has contributed the most to the satisfactory use of large mileages of highways is the maintenance programs of the state highway departments. Common consent will concur that the greatest loss in the past has come from a failure to maintain. With few exceptions the state highway departments that have been entrusted with the responsibility are cautiously conserving the investment they are making by careful maintenance.

HIGHWAY FUNDS AND THEIR ADMINISTRATION

Yet as is pointed out, about 60 per cent of the total highway expenditures

are still under control of the local organizations, mainly the counties, and it is this expenditure that is drawn largely from property taxes. At a time when great complaint is heard over land taxes, the fact should not be overlooked that so much of these taxes as are used for roads are levied and expended in the main by local boards for local road purposes. This is not a criticism. These roads are to a large extent land service roads and are properly a charge upon the whole community, urban and rural, but there is great need for better administration of these funds.

The proper financing and administration of the vast mileage of secondary roads under local authority is today progressing toward satisfactory solution slowly and uncertainly. An extension of supervision by the trained organizations of the state highway departments would accomplish much progress to better this situation.

THE COUNTRY'S SURFACED ROADS

The Bureau of Public Roads makes an investigation at five-year intervals to obtain complete data relating to the total highway mileage of the several states, the number of miles which are surfaced and the types of surfacing, and expenditures and revenues for highway purposes. The latest figures compiled are for the year 1921. At the end of that year there were 2,941,294 miles of highways in the United States, not including city streets and streets within incorporated municipalities. Of this total mileage 387,760 miles, or 13.2 per cent, were improved with some type of surfacing; 2,553,534 miles, or 86.8 per cent, were known as ordinary earth or dirt roads. During the year 1921, 41,171 miles were added to mileage of surfaced roads, and during 1922 it was estimated that about 35,000 miles were surfaced. This does not mean that the mileage of earth roads was

decreased in each of these respective years by this addition of surfaced road mileage, because in many cases roads which had a gravel surface, for example, were improved by applying a higher type of surface such as macadam or concrete.

In the following table are set forth by divisions of states the total mileages of all types of roads, the number of miles of surfaced roads and the mileages of earth roads and their percentage relationship as reported for January 1, 1922.

The highest percentage of surfaced mileage is found in the East North Central states, where 30.1 per cent of

387,760 miles is composed of the following types:

	MILES	PER CENT
Sand-clay	63,339	16.3
Gravel	199,899	51.5
Macadam	87,609	22.6
Concrete	15,611	4.0
Bituminous Concrete ..	4,978	.3
Brick	3,333	.9
Miscellaneous	12,991	3.4
Total	387,760	100.0

PROGRESS IN HIGHWAY IMPROVEMENT

Since the advent of the use of the motor vehicle great progress has been

DIVISION	TOTAL MILEAGE OF ALL TYPES	SURFACED MILEAGE		EARTH ROAD MILEAGE	
		Miles	Per Cent of Total	Miles	Per Cent of Total
New England	83,295	17,725	21.3	65,570	78.7
Middle Atlantic	186,935	38,946	20.8	147,989	79.2
East No. Central	412,753	124,298	30.1	288,455	69.9
West No. Central	759,820	30,223	3.9	729,597	96.1
South Atlantic	365,567	61,178	16.8	304,389	83.2
East So. Central	242,745	41,478	17.1	201,267	82.9
West So. Central	416,617	23,986	5.8	392,631	94.2
Mountain	306,382	15,539	5.1	290,843	94.9
Pacific	167,180	34,387	20.6	132,793	79.4
Total	2,941,294	387,760	13.2	2,553,534	86.8

the total highway mileage has been improved with some type of surfacing and only 69.9 per cent of the highways are earth roads. In the West North Central section, on the other hand, the relatively smallest surfaced road mileage is found; only 3.9 per cent of the roads are surfaced and 96.1 per cent are earth roads. In this connection it should be borne in mind that this section of states contains approximately 25 per cent of the country's total highway mileage.

The country's surfaced mileage of

made in highway improvement. In 1904, the first year for which highway data were obtained by the Bureau, the total mileage of our rural roads amounted to 2,151,379 miles, of which only 153,530 miles, or 7.1 per cent, were improved with some form of surfacing. Thus, while 789,915 miles had been added to our total highway system during the 17 years from 1904 to 1922, only 234,230 miles had been added to our surfaced mileage during the same period. In other words, the mileage added to our highways was 3½ times

as great as the mileage added to our surfaced roads. The actual amount of highway improvement which was accomplished during these years, however, is much greater than the above figures would seem to indicate. A large mileage of low-type roads has been replaced with types more suitable to the present traffic requirements. Light and narrow bridges have been replaced with wider and more substantial structures. Old narrow roads have been widened and straightened. In 1904 the highest type of surfacing found on our rural roads was water-bound macadam. At the beginning of 1922 a total of more than 25,000 miles of our rural roads were improved with high-type pavements.

But even when full account is taken of all these improvements and betterments it is still clearly evident that our highway improvements have not kept pace with the increase of the traffic on our highways. In 1904 our highway traffic was almost entirely horse-drawn. Prior to 1904 not more than 40,000 motor cars had been manufactured in the United States. A single factory now produces more cars in a single week. On July 1, 1924, the total motor car registration of the country amounted to 15,552,077 as compared with a registration of 13,002,427 twelve months previous.

MAINTENANCE OF RURAL HIGHWAYS

The construction and maintenance of our rural public roads is carried on by many varied and independent units, such as the states, counties, towns, townships and road districts. The total disbursements during 1921 by all of these governmental units for all highway purposes, including interest and payments on highway bonds, amounted to \$1,036,587,772. This amount spent on our highways in a year was substantially the same amount the rail-

roads of the country were entitled to earn as profits under the Transportation Act according to the Interstate Commerce Commission. Of this total amount paid out for highways \$626,965,373, or 60.5 per cent, was expended for work classed as construction; \$248,593,169, or 24 per cent, for work classed as maintenance; \$36,031,353, or 3.5 per cent, for administration and engineering; \$89,280,946, or 8.6 per cent, for the payment of principal and interest on highway bonds, and \$35,716,931, or 3.4 per cent, for the purchase and repair of machinery, equipment, the purchase of quarries, gravel pits, and for all other items or parts of items not properly chargeable to construction, maintenance or administration.

Of the grand total disbursements of \$1,036,587,772 for 1921 there was expended \$413,241,662 by or under the supervision of the respective state highway departments; \$623,346,110 was paid out by the various local counties, towns, townships and districts without any supervision by the respective state highway departments. These expenditures are set forth in detail in the tabulation on the following page.

It is a noteworthy fact that approximately 60 per cent of the money spent on the rural highways of the country was spent by local communities and upon highway work which was not under the supervision of state highway departments.

The gross total of the funds actually made available for all rural highway purposes during the year 1921 amounted to \$1,149,437,896. Of this total, \$438,109,273, or 38.1 per cent, was secured from the sale of bonds; \$415,680,010, or 36.2 per cent, from general taxes; \$122,626,166, or 10.6 per cent, from motor vehicle fees and gasoline taxes; \$79,333,226, or 6.9 per cent, from Federal aid payments received by the various states; and \$93,689,221, or

LOCAL HIGHWAY EXPENDITURES, WITHOUT STATE SUPERVISION

Construction, roads and bridges.....	\$316,225,470	
Unclassified construction (probably largely maintenance).....	18,766,090	
Maintenance, roads and bridges.....	174,066,423	
Engineering and administration.....	17,149,498	
All other items.....	97,138,629	
Total.....		\$623,346,110

HIGHWAY EXPENDITURES BY OR UNDER SUPERVISION OF
STATE HIGHWAY DEPARTMENTS

Construction, roads and bridges.....	\$291,973,813	
Maintenance, roads and bridges.....	74,526,746	
Engineering and administration.....	18,881,855	
All other items.....	27,859,248	
Total.....		413,241,662
Grand total.....		\$1,036,587,772

8.2 per cent, from various other sources, the chief of which was from appropriations or allotments from general funds originating from two or more sources. It is estimated that approximately one-half of this unclassified income originally came from general property taxes.

METHODS OF FINANCING THE
HIGHWAYS

In every state except North Dakota a part of the funds expended on roads was obtained from the sale of bonds. Arkansas, West Virginia and Louisiana obtained respectively 70.2 per cent, 69.1 per cent, and 68.1 per cent of their total road income from bonds while, on the other hand, New Hampshire and Connecticut secured only 2.8 per cent and 3 per cent of their total highway revenues from bonds. Certain groups of states relied largely on bonds for their highway funds. Thus, the four states of Arkansas, Louisiana, Oklahoma and Texas, comprising the West South Central group of states, secured 59.3 per cent of their total highway funds from this source. At the other extreme we find the six states, forming the New England group, which received only

12.7 per cent of their total highway funds from the sale of bonds.

At the end of 1921 the total amount of highway bonds outstanding was \$1,222,312,300. Of the whole issue 72 per cent are represented by local bonds, the obligations of counties, townships, and districts; 28 per cent are the obligations of state governments. Twenty-seven of the states have no state highway bonds outstanding. In those states, with the exception of Vermont and North Dakota, the outstanding highway bonds were all issued by local governmental units. The United States Census Bureau reported the total amount of bonds issued for all purposes by states, counties, and all other subdivisions to have been \$8,695,906,000 at the end of 1922. Comparing this with the outstanding highway bonds at the close of 1921 we find that but 14 per cent of the total indebtedness of the states, counties and other political subdivisions was represented by local and state highway bonds.

General property taxes contributed \$415,680,010 to the year's total highway income. As has already been indicated, \$93,689,221 was derived from miscellaneous sources, a large part of which was traceable to taxes although

appropriated from general funds in state treasuries. For our present purposes we may consider both of these items as having been payments made by the general public and may, therefore, be regarded as taxes, although a small portion was derived from other sources which could not be clearly segregated. The sum of these two items, \$509,369,231, or 44.4 per cent of the total highway income for 1921, may be regarded as the direct contribution of the public through taxes towards the cost of highway construction and maintenance and towards the principal and interest payments of the bonds outstanding. The per capita tax burden for highway purposes was for that year \$4.83. The total taxes, fees, etc., in 1921, amounted to \$38.80 for the country as a whole. Therefore, the highway tax burden was about 12 per cent of the total per capita tax burden.

FEDERAL AID FOR HIGHWAY CONSTRUCTION

Federal aid legislation for highway construction in co-operation with the several states had its beginning in 1916 when an appropriation of \$75,000,000 was made for this purpose by Congress. The law provides that such Federal aid funds be apportioned among the states in the following manner: one-third in the ratio which the area of each state bears to the total area of all the states; one-third in the ratio which the population of each state bears to the total population of all the states, as shown by the latest available Federal census; one-third in the ratio which the mileage of rural delivery routes and star routes in each state bears to the total mileage of rural delivery and star routes in all the states. In approving projects to receive Federal aid under the provisions of the Act, preference is to be given to such projects as will expedite the completion of an adequate and con-

nected system of highways, interstate in character. The amount paid as Federal aid to any state on account of a definite project of highway construction must not exceed 50 per cent of the total estimated cost thereof, except in case of any state containing unappropriated public lands exceeding 5 per cent of the total area of all lands in the state, when the Federal aid payment on such projects shall not exceed 50 per cent of the total estimated cost thereof, plus a percentage of such estimated cost equal to one-half of the percentage which the area of the unappropriated public lands in such state bears to the total area of such state. This provision was written into the law to make it easier for those states to finance their share of highway construction costs in which the Federal Government owned large areas of public lands. The maximum amount which the Federal Government can contribute in ordinary cases is limited to \$15,000 a mile. Before any aid can be obtained the Federal Government's approval must be secured as to the type of road and width of construction of the proposed project. Consideration is given to the type and character which shall be best suited for each locality and to the probable character and extent of the future traffic. One of the most important sections of the Act provides that before any project shall be approved for any state, such state must make provisions for the construction and maintenance of Federal aid highways by or under the supervision of a state highway department. Unified and responsible control is thereby insured.

For the period ending June 30, 1924, the Federal Government expended as aid for highway construction \$353,082,098. While it is not possible to trace an individual dollar's passage through the Federal treasury, it may be pointed out in this connection that the internal

revenue collected as taxes on the sales of motor vehicles and accessories and on passenger cars for hire amounted to a total of \$749,040,569 up to June 30, 1924. The users of motor vehicles, therefore, contributed more than twice the amount that the Federal Government paid out in aid toward highway construction. The Federal aid payments and the Federal motor vehicle taxes are shown by years in the following tabulation:

YEAR ENDED JUNE 30	AMOUNT OF FEDERAL AID AND FOREST FUNDS EXPENDED	INTERNAL REVENUES COLLECTED FROM MOTOR VEHICLES, ETC.
1917.....	\$49,279	.....
1918.....	837,176	\$23,981,268
1919.....	3,995,102	49,341,990
1920.....	25,168,794	145,963,034
1921.....	63,533,861	117,322,741
1922.....	93,924,885	106,219,381
1923.....	77,173,116	146,183,607
1924.....	88,399,885	160,028,548
Total....	\$353,082,098	\$749,040,569

SOURCES OF HIGHWAY FUNDS COMPARED

That there is a marked tendency to collect a larger proportion of highway funds from the owners and users of motor vehicles is noted in analyzing the various sources of these highway funds and comparing them with similar sources in previous years. A survey of highway revenues and expenditures for 1914 showed that, out of a total highway income of \$240,262,784, the collections from motor vehicles amounted to \$12,382,031, or 5.1 per cent of the total. In 1921, seven years later, the motor vehicle owners and operators paid \$118,942,706 in motor vehicle fees and \$3,685,460 in gasoline taxes, a total of \$122,628,166, or 10.6 per cent of the total income for highway purposes. A

similar compilation of the payments made by owners and operators of motor vehicles for licenses and permits in 1923 shows a total contribution on their part of \$188,970,992. In the same year the taxes upon the sale of gasoline levied by 35 states amounted to \$36,813,939. The motor vehicles, accordingly, contributed a total of \$225,784,931 during this last year when complete data were available.

It is estimated that the highway income and expenditures for 1923, based upon information thus far obtained, were substantially the same as for 1921. Construction and maintenance programs proceeded at about the same pace. Upon this assumption, therefore, it appears that in 1923 the contribution of the motor vehicle towards the total highway income was about 19.5 per cent. This shows a very substantial increase in the relationship of motor vehicle revenues to the total highway income, as compared with 1914, when it was only 5.1 per cent. Between 1921 and 1923, it is observed, the ratio almost doubled. This increase in the contribution made by the motor vehicle is accounted for by the increase in the total number of vehicles registered and in the payment per vehicle, which rose from \$11.70 in 1921 to \$15 per vehicle in 1923.

As long as the emphasis in licensing automobiles was placed upon the state's police power a flat charge of a certain amount upon the registration of the car was deemed sufficient. The fee in most cases was nominal and was not regarded as a revenue-producing measure. When, however, the licensing of motor vehicles and the collection of registration fees began to be related to the problem of highway construction and maintenance, the revenue aspect was brought into prominence, and as the rate was advanced, classification systems were introduced which would

take into account both the extent of the damage to the road resulting from the operation of a heavy and high-powered car over the highways and the owner's ability to pay. In 19 states passenger automobiles are licensed and fees charged on the basis of rated horse power; in 7 states the weight of the vehicle determines how much of a fee is collected; in the rest of the states combinations of these two methods are followed or other schemes of classification have been devised which are intended to produce similar results. In making charges for the licensing of motor trucks most of the states base the fees upon capacity and gross weight.

In 1923, of the \$188,613,074 collected by the states as motor vehicle license revenues (\$357,918 collected by the District of Columbia not included) \$153,226,636, or 81 per cent, was used by highways by and under the direction and supervision of state highway departments. In only 13 states were any substantial amounts apportioned among the counties. The 19 per cent which was not used by the state highway departments includes, in addition to the funds turned over to local units, the expenses of registering cars and the issuing of licenses and other administrative expenses of similar character.

At about the time when most of the states had succeeded in abolishing the old turnpikes and toll roads, by purchasing them at agreed prices or through condemnation proceedings, and had declared them "free" highways, a movement started which in essence was an extension of the toll principle to all highways of a state brought about through the enactment of laws providing for a tax upon the sale of gasoline. This year, 1924, there are 35 states and the District of Columbia which are collecting this kind of a tax; these states have a rural road mileage

of 1,954,886 miles comprising 66.5 per cent of the total rural highway mileage of the country. The rates range from 1 cent to 4 cents a gallon; 8 states charge a 1-cent tax; 15 states a 2-cent tax; 2 states a $2\frac{1}{2}$ -cent tax; 9 states a 3-cent tax; and 1 state a 4-cent tax. The total gasoline taxes collected in the six months ending June 30, 1924, amounted to \$32,430,410. It is estimated that for the whole year of 1924 close to \$75,000,000 will be derived from this source. The disposition of the gasoline tax differs from that of the motor vehicle license fees. In 1923 only 58.5 per cent of the total gross gasoline tax receipts was applicable to highway work by or under the supervision of state highway departments. There was a greater tendency for the states to share these newly discovered revenues with the counties and to divert them for other purposes than in case of the motor vehicle license fees.

HIGHWAY COSTS

The cost of highway construction may be divided into (a) cost of enduring features and (b) cost of perishable features. When roads are built with accepted standards of grade, alignment, drainage structures, and foundations, the cost of such elements may be charged for enduring features. It is manifestly poor policy to build an expensive surface or a relatively long-lived surface on defective grades with poor alignment, or where the drainage features are short-lived and temporary. Construction should be so adjusted to the service needed that its purpose is accomplished without waste. Highways constructed with borrowed money should be strictly maintained. This is no less true for all improved roads. Maintenance is necessary in order to insure to the community the maximum economic service by the road and also

to preserve the investment. In many cases it has not been customary for officials to face frankly the cost of maintenance and repair on bond-built highways at the time when the bonds are issued and before construction begins. Provision for meeting the interest payments and for retiring the bonds as they become due is often the maximum consideration given to roads con-

structed with bond issues. This is perhaps the gravest defect in the project of building highways by issuing bonds. This repair and maintenance charge is inevitable, and since the earning power of a road in reducing transport costs tends to increase with the degree of the maintenance, it is sound business to face the repair and maintenance costs in the beginning.

The Storage of Dead Vehicles on Roadways

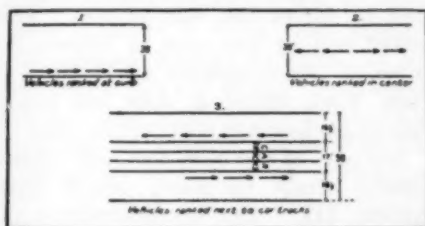
By WILLIAM P. ENO

Chairman of the Board of Directors, Eno Foundation for Highway Traffic Regulations, Inc.

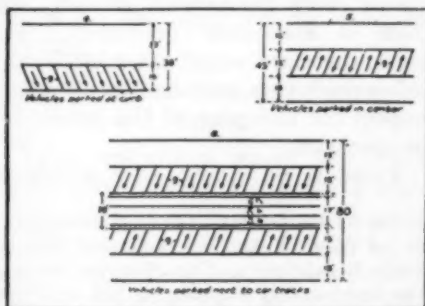
THIS discussion has to do with what is often inaccurately termed "The Parking Question."

Much of the difficulty we are now experiencing through the storage of waiting vehicles on roadways is due to the fact that we have not discriminated between the terms "to rank" and "to park" or between "live" and "dead" vehicle. We must get these points straight in our minds before we can intelligently attempt to bring about better conditions. The terms "to rank" and "to park," while applicable to both live and dead vehicles, relate only to their relative positions to one another and to the curb. The definitions are:

"To Rank—To stand vehicles one behind the other parallel to curb."



"To Park—To stand vehicles parallel to one another at an angle to curb."



The term "to rank" is derived from the term "cab rank," as used for generations in London, where cabs are placed on stands one behind the other in file, and the term "to park" from the practice of placing gun carriages parallel to one another, in which position they are said to be parked. It is therefore clear that the terms "to rank" and "to park" are not synonymous, but that there is a practical and important difference between the two.

In regulating ranking or parking, we must divide vehicles into "live" vehicles and "dead" vehicles. The definitions are—"Live" vehicle one whose driver is present and prepared to move vehicle; "dead" vehicle one whose driver is absent or unable to move vehicle.

When vehicles are ranked, no one of them can move out of the line independently of the others, unless considerable waste space is allowed for between them, whereas when they are parked, being parallel to one another, any one of them can get away without causing any other one to move.

Live vehicles do not give any unreasonable annoyance or cause a serious fire hazard if the Council of National Defense (C. N. D.) Code of General Highway Traffic Regulations¹ is in effect. Dead vehicles, however, constitute not only great inconvenience to the general public and injury to business, but a veritable menace likely to result in uncontrollable conflagrations because fire apparatus cannot reach its destination promptly.

In considering the question of ranking and parking we should take into account the requirements of Article III of the C. N. D. Code of General Highway Traffic Regulations as follows:

¹ See Article III next page.

ARTICLE III. RANKING, PARKING, STOPPING, FOLLOWING, BACKING

Section 1. A live or a dead vehicle may be ranked or parked on any roadway and for any length of time, provided it does not interfere with the rights of others, and subject to the following sections of this Article, unless prohibited from so doing or limited as to time by an official traffic sign or special regulation.

Sec. 2. A dead vehicle shall not be left on a congested roadway during crowded hours except on an indicated public ranking or parking space, subject to local police traffic signs, nor shall it be left in such a position as to prevent other ranked or parked vehicles from moving away nor so as to obstruct moving traffic.

Sec. 3. A vehicle stopped in front of an entrance to a building or transportation station, unless it be expeditiously loading or unloading, shall promptly give place to an arriving vehicle.

Sec. 4. A vehicle shall not be stopped on a crosswalk, nor within an intersection, nor within ten feet of a fire hydrant, except in an emergency, nor with any part of its load extending beyond limit lines.

Sec. 5. A vehicle on a two-way traffic roadway shall stop at the right hand curb only, but not at all if preventing other vehicles from passing in both directions at the same time.

Sec. 6. A vehicle on a one-way traffic roadway may stop at either curb, but not at all if preventing other vehicles from passing in one direction.

Sec. 7. A four-wheeled, horse-drawn vehicle backed up to the curb shall have its horses stand parallel to the curb, faced with the direction of traffic.

Sec. 8. A vehicle shall not follow another too closely for safety, nor fire apparatus, going to a fire, closer than 500 feet.

Sec. 9. A street car shall not be stopped nearer to another street car ahead than five (5) feet.

Sec. 10. A vehicle shall not back to make a turn or in any way so occupy a roadway as to obstruct traffic.

Your attention is called to Sections 1 to 7 inc., which, except Section 2,

apply to both "live" and "dead" vehicles and are sufficient for the reasonable control of "live" vehicles whether ranked or parked. They are, however, not ample for the control of "dead" vehicles and therefore Section 2 has been inserted. This section is probably as definite as we can wisely make a general regulation. Any further control, where necessary, should be brought about through special regulation by the use of such traffic guides as lines on the pavement and properly designed clearly worded signs.

One of the results of Section 2 of Article III will be that vacant lots will be leased to store waiting vehicles and it will become profitable to construct public garages where cars can be left during the day when people are attending to their business and during the evening when they are at the theater. Some of these storage places will undoubtedly be in the congested parts of cities and others a little way out where people will leave their vehicles and proceed to their destination by street car, bus or taxi. This latter will be the case, I believe, in some of our congested cities such as New York where it does not really pay to go downtown in private cars.²

No part of the code has had a more careful study by more people than Article III. The considerations involved are complicated because it is difficult to preserve the rights of all and at the same time refrain from imposing more restrictions on any one than is absolutely necessary. We must, therefore, count upon intelligent police discretion, and the education and respect for fair play of the public for co-operation.

There is no reason why a vehicle

² For further description, history, development, etc., of the C. N. D. Code of General Highway Traffic Regulations see 1924 Municipal Index of *The American City Magazine*, pp. 272 to 275 inc.

should not rank or park anywhere, provided that in so doing it does not unreasonably restrict the liberty of others. See Section 3, which says:

A vehicle stopped in front of an entrance to a building or a transportation station, unless it be expeditiously loading or unloading, shall promptly give place to an arriving vehicle.

This, of course, requires the driver of the waiting vehicle to be ready to pull out immediately on the approach of an arriving vehicle. Such strictness as this implies is absolutely necessary on roadways where the importance of getting to the curb is paramount, as, for instance, on roadways devoted to retail trade, and to a slighter degree on those devoted to residences. Where wholesale business predominates, the necessity of allowing sufficient time to load or unload has to be adequately considered.

In enforcing the provisions of Article III, it should be noted that a vehicle ranked or parked, when not in the way of moving traffic, should not be compelled to enter it again until another vehicle comes to take its place. It is a case where the old adage, "Let sleeping dogs lie," applies. It is clear that while this provision of the code should be enforced strictly when congestion exists, it need not be so strictly insisted upon when congestion does not exist. Of course, every driver, out of common decency, should refrain from leaving his vehicle where it will block access to the door of an occupied building.

GENERAL RANKING AND PARKING SPACES

There are many spaces which can be used for ranking and parking without interfering with the flow of traffic on the roadway. These should be regarded as general ranking or parking spaces. (See Section 1 of Article III.)

Ranking and parking spaces are better marked out by paint limit lines, but whether marked or not marked, they should be free for vehicles to rank or park in. Among such spaces are those alongside parks, vacant lots, public and vacant buildings and buildings where the doors or entrances are not in regular use. Briefly, these spaces may be defined as all those not in front of a regularly used entrance to a building or to a transportation station.

No private signs prohibiting ranking or parking should be allowed, but the Police Department should furnish signs on application of property owners if the reason given is adequate. All signs, like everything else in traffic, should be standardized. The signs for stationary vehicles, designating parking spaces, cab-stands, car and bus stops are known as secondary signs, and should have black letters on a vivid yellow background.

The economy of room for waiting vehicles as well as for moving vehicles on many congested roadways is so important that it is well worth while to define by paint lines every such space that can be used to hold one or more vehicles.

SPECIAL RANKING AND PARKING SPACES

Besides the general ranking and parking spaces already described, there are others, especially adapted to provide for waiting vehicles. Some of these are in the center of streets; some, in very wide streets, are next the car tracks, and others are where streets come together at acute angles. These spaces are often of irregular shapes, filling space not required for lines of moving vehicles. It is of the utmost importance that *all such available spaces in the congested parts of cities be scientifically marked with paint limit lines or be paved with a different*

kind of pavement from the rest of the roadway and furnished with signs with the words, "Public Ranking Space" or "Public Parking Space," as is best adapted to the local possibilities. In these spaces vehicles should usually be allowed to remain unless at certain hours it is necessary to limit their time, when the sign should have on it such additional wording, as, for instance, "30 Minutes from 3 to 7 P. M."

Parking spaces should have stalls not less than $7\frac{1}{2}$ feet or more than 8½ feet wide for vehicles marked by paint lines. Stalls for trucks, sight-seeing vehicles, etc., should be wider.

Vehicles should be parked at an angle to the curb of 90 degrees, 45 degrees, $37\frac{1}{2}$ degrees or 30 degrees, as is best adapted for local conditions. The width of a parking space located in the middle of a street where vehicles are to be parked at an angle of

90°	should be at least	15'
45°	" " " "	15'
$37\frac{1}{2}$ °	" " " "	14'
30°	" " " "	13'

When the parking space is next to the curb, these widths can be reduced one foot each, respectively, as a portion of each vehicle can project over the curb about that much.

Vehicles should never be parked at an angle of 90 degrees to the curb, except in certain locations, when waiting for the termination of the races, theatre, etc., or when loading or unloading merchandise, and in some instances on cab stands. In parking at an angle of 90 degrees to the curb, it is apparent that to get into a stall in the parking space will very often necessitate backing once or even several times.

When vehicles park, unless waiting for the termination of some gathering, they should drive directly into their stalls and back out when ready to

leave. This method will avoid seriously retarding other traffic if the time chosen to back out is when there is a slight let-up in traffic.

If the opposite is done, i.e., passing the stall to be occupied and backing into it, it must always retard the vehicles which are directly behind.

Ranking spaces in the middle of a street should have the side lines six feet apart. If at the curb, one line six feet from the curb should be used.

Some streets are wide enough to park on both sides and allow the necessary room for moving vehicles in the center. Others can have vehicles parked on one side and ranked on the other, provided room is left for moving vehicles.

In one-way traffic streets, if a parking space is to be marked on one or both sides, the stall lines should slant towards the approach of traffic.

CAB, HACK, TRUCK AND SIGHT-SEEING VEHICLE STANDS

Cab, hack, truck and sight-seeing vehicle stands should be marked by signs giving the number of such vehicles each stand is intended for. The vehicles should be *ranked* usually in the middle of the roadway or next the curb, as best suits each locality. There are, however, a considerable number of places where vehicles can be *parked* advantageously either in the middle of the roadway or at the curb. At such places an angle of 90 degrees is ordinarily to be preferred, as it best enables such vehicles to leave the parking space so as to proceed in either direction with equal facility. However, this is not always the case. Sometimes such stands are located in the center of the roadway, where, if *other* vehicles are *ranked* at the curb, there is not sufficient room for entering or leaving the stand to join in with the moving traffic without manœuver-

ing by backing and thus impeding it. In this case an angle of 45, 37½ or 30 degrees should be substituted.

When *parked* at the curb, public vehicles should be backed into the parking space so as to be ready to drive directly out into the traffic when leaving. *This latter method is exactly opposite to what is advised for usual parking purposes.*

The greatest opposition which we shall have to my recommendations will be from owners of cars who have no chauffeurs, who will claim that class legislation is being proposed, whereas it is *they* who desire class legislation because what they want to do is to leave their cars where they will be a nuisance and a menace. This should not be permitted under any circumstances—whether they have chauffeurs or not. It is not a question of chauffeur but one of nuisance and menace.

Surely conveyances such as street cars, busses and taxicabs, which are available to the general public, should have precedence, if necessary, over those for private use only, but we do not permit these to stand indefinitely where they would be a nuisance and a menace.

REMARKS

In many cities, the regulation of dead vehicles is comparatively easy, as, for instance, in Washington, where there are scores of places, many of them in business sections, where in the aggregate thousands of cars could be ranked or parked if the spaces were skilfully laid out and where they would create no menace in case of fire and no hindrance to moving traffic. In New York, however, there are but few such places which can be set aside for waiting vehicles and therefore the problem is more difficult.

The primary objects of roadways are to enable vehicles to go from place to

place and to set down or take up passengers and to load and unload merchandise. Vehicles which are confining their activities to these objects should, of course, be let alone so long as they observe the general traffic regulations, but vehicles which are encumbering the roadways for individual indulgence and convenience should be strictly restrained from doing so.

This paper has been written for technical men, especially for those who are making a study of traffic regulation as a branch of civil engineering. In the not distant future, these problems will be their problems, and they will be employed by the government to work them out. Only by specialists can complicated traffic problems be solved, and the problem of providing for the accommodation of the greatest number of waiting vehicles in a given space on the highways and in specially constructed storage places is one of our greatest civic problems today. The time when such things are left to inexperienced members of police departments or of so-called traffic advisory committees is about over. Already six of our great universities have interested themselves in highway traffic regulation, and soon courses of instruction will be part of the curriculum. Of the fifty billions of dollars invested in our country in transportation, less than twenty billions is in railroads, more than twenty in highway transport and ten in electric roads and waterways. That is to say, in about a quarter of a century highway transport has from nothing already passed the railroads, and is steadily increasing in relative volume and importance. It is needless to say that the best minds must be employed on the regulation of highway traffic, if we expect to prevent the now appalling and needless loss of life and to make highways transport function without

undue delay and with the greatest efficiency.

It is up to all associations interested in traffic regulations to keep their eyes on city engineers and other officials who in their ignorance of traffic requirements are cutting off corners on a rule of thumb radius, permitting car-tracks to be laid out unscientifically, placing traffic towers in the wrong places and allowing fountains and other monuments to be erected where they unduly limit ranking and

parking facilities, and so forth, and so on. It is easier to prevent than it is to remedy.

It may be interesting to know that on account of the urgent necessity for solving this question of ranking and parking, especially by dead vehicles, the Eno Foundation for Highway Traffic Regulation is this year giving prizes at Yale and at George Washington Universities for essays on the subject which will add value in bringing about a satisfactory solution.

Safeguarding Traffic

A Nation's Problem—A Nation's Duty

BY GEORGE M. GRAHAM

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Vice-president, Chandler Motor Car Company.

THE safe operation of highway traffic is a national problem. Its importance constantly grows in just the degree that individual transportation increasingly dominates our daily life. Individual transportation, as typified in the motor vehicle, exerts its influence on everything, facile communication, education, living costs, comfort, pleasure and family ties. The infinite benefactions of the automobile will not pay out one hundred per cent unless they can be underwritten by the more efficient safeguarding of life and limb.

This is everybody's duty because it is everybody's problem.

All of us are pedestrians some of the time. Probably half of us are motorists a portion of the time. At one hour we think as pedestrians. At another we think as motorists.

We have the pedestrian's viewpoint when we furiously resent the boisterous horn discharged directly at our ear, or curse the driver who makes us leap or be run down.

We take on the motorist's complex when we arraign the stupidity of the man afoot who does so little to keep out of the way.

CONCERNS ALL OUR PEOPLE

Striving for a solution of this great problem is excellent democracy, since in one form or another it concerns all of our 110,000,000 population.

Well might it be asked—who created this state of menace? Who has put the highway safety in jeopardy? Is it up to the pedestrian? Is it up to the driver? Is it up to the officials who seek to regulate traffic? Is it up to the manufacturer who builds the car and the dealer who sells it?

Actually, not one of these groups need accept responsibility.

The problem is not the creation of an individual or organization. It is the offspring of an impulse which traces back to the beginning of known history:

The demand for swifter and better transportation, subject to the control of the individual operator.

No human aspiration over the centuries has been stronger, no striving more intense. It explains the migration of the pioneer. It defines a Columbus, a Magellan, a Vasco di Gama. It is the answer to a Shackleton or a Peary. It makes clear the Lewis-Clark expedition. It tells why C. P. Huntington and "Jim" Hill carried great railroads across the continent. It furnishes the solution of the recent globe girdling trip by the American aviators.

As long as the earth's people insist on rapid movement from place to place, there will be a transportation problem, and that will be always. Nowhere is this problem so acute as in our own expanding and achieving country. New roads everywhere springing into existence but momentarily relieve congestion. They are speedily filled with new caravans of motorists. In the cities the one-time municipal centers no longer have space to care for commerce and trade.

BUSINESS INVADES THE SUBURBS

Hence, we see the up-springing of great outlying suburban sections, cities in themselves, which have their own stores, banks, etc.

Where lesser communities formerly merged into the great centers of population, now urban congestion is driving them back to a separate existence.

The great need of traffic protection affects alike the crossroad farmer and the tenement dweller. The problem is federal and state, rural and municipal, local and universal.

The almost incredible increase in the number of automobiles and motor trucks has carried us, in little more than two decades, from a total of 13,000 registered automobiles and trucks in 1900 to more than 15,000,000 at the end

of 1923. This is a gain of 111,000 per cent in little more than two decades.

Last year for the first time in the history of the automobile industry the total production of cars and trucks exceeded 4,000,000. It took 7,000,000,000 gallons of gasoline to run the nation's cars last year.

An increasing toll of disasters has constantly been levied against traffic. The development can better be understood by comparing automobile deaths with the total mortality of the United States.

The term "Automobile Deaths" is not an accurate one. As commonly used, it is applied to all fatalities in which an automobile figures, whether the driver be responsible or not. Without conceding the accuracy of the designation I accept it for the purpose of this presentation.

"AUTOMOBILE DEATHS" WERE ONE PER CENT

In 1921, which is the latest year for which complete statistics are available, there died in the United States from all causes somewhat in excess of a million and a quarter of persons; 74,000 of these met death by accident.

Automobile deaths, 12,500, were one per cent of the grand total, and sixteen per cent of the fatal accidents. It has been pointed out that the total of automobile deaths is growing. This is lamentably true, the figures for 1922 showing 14,000 deaths, and for 1923, 15,750. Yet there should be some encouragement in the fact that the increase in automobile deaths does not keep pace with automobile use. Twelve thousand, five hundred deaths in 1921 meant one for every 837 cars; 15,750 deaths in 1923 would mean one to every 921 cars, an appreciable reduction.

It is necessary to think of our great problem in terms of four main groups, as follows:

First—The pedestrian.

Second—The motorist.

Third—Those who make and sell the cars.

Fourth—Those who are responsible for traffic laws and their administration.

As the rights of each of the four groups are examined it will be found that there is no such thing as any collective blame. Certainly the citizen cannot be blamed in wishing for himself and family the right of safe transit on our streets and highways. It is true that much use of the highways afoot is reckless, but this is small as compared with the percentage that is careful.

AUTOMOBILE A BOON OF PROGRESS

Nor as a class can the motorist be blamed. He is justified in seeking for himself and his family all the benefits of an automobile.

All that is essential to our daily life—food, fuel, raw material, finished product and facile passenger communication—more and more depend upon the automobile.

Along with the victrola, the radio and the moving picture, the automobile has changed the daily life of our people, made the family rather than the individual the unit of pleasure.

Before the days of the automobile, members of a family often took their diversions apart. Now on Sunday the whole family gets into action together. Everybody goes to the big picnic.

Into the little car are crowded father, mother, five children, grandmother, the dog, rugs, newspapers, fishing poles, bird cage, and even mother-in-law, for it is a day of truce when all natural hatreds cease. Nothing could be finer than this day of family outing. It brings the children into the healthful open. It is family companionship while the children are still in the home group. Far be it from us to curtail it.

We should rather extend it as a great helpful influence.

Therefore, the motorist is not to be blamed, excepting that small percentage of evil offenders who drive recklessly or drunkenly.

The automobile manufacturer and the automobile dealer are in no sense at fault as long as they sell high-class products into which has been built every possible safety factor.

Those who administer and direct traffic have, in my judgment, done excellent work, considering the immense ramifications of the problem. Particularly would I pay tribute to the traffic officer who must be at his post in all extremes of weather; must protect the unskilled; must curb the reckless and maintain his temper in the face of infinite causes of provocation.

We cannot segregate the blame to any group. Responsibility is shared by all of that public we seek to protect.

Progress will not permit the elimination of the automobile. We must, therefore, strive to find a way to safeguard its use. The problem is in every respect a new one.

PROGRESS LONG A LAGGARD IN TRANSPORTATION

There are no precedents, for never in the history of the world have so many people owned mediums of individual transportation.

In fact, I should like to direct your attention to an astonishing thought—transportation is perhaps the youngest of all those great sciences which have advanced the public weal.

Go to the authorities and study the history of transportation. You will be amazed to find that until the last one hundred and twenty years there is no advance.

It is hard to realize that anything so vital to human kind as transportation should have been so slow in its develop-

ment. The man of Nazareth, founder of the faith, and George Washington, father of his country, living 1800 years apart, knew only the same mediums of transportation. On land they could be hauled by man or beast. On the water they were dependent upon the straining muscles of the oarsmen or the vagaries of the wind.

This is an almost incredible thought when set against all that happened in the world in the same lapse of years. The culture of Greece, the far-flung power of Rome, the mighty empire of Charlemagne all had their rise, their history and their fall. The Dark Ages and the Middle Ages came and went. The Crusades wrote their dramatic history. In the 15th and 16th centuries came that great outburst of exploration that carried the mariners of Europe all over the world to the discovery of new countries.

Three great revolutions, in England in 1688, in our country in 1776, and in France in 1793, made their contributions to free institutions. Inventors achieved both for good and ill. They discovered gunpowder. They invented printing. The great art works of all times, paintings, statues, buildings, mountain peaks of human genius, all came to the world while transportation remained primitive.

Actually, the history of modern transportation can be written within the last 120 years.

Fulton with the first steamboat in 1806; Stephenson with the first locomotive some score of years later; the electric trolley in the final quarter of the last century; and finally in our day the internal combustion motor vehicle on land, water and in the air, represent more progress than had previously been made in all recorded history.

Therefore, we cannot consult any authorities. We cannot go to any text

book. We must originate our own methods for safeguarding traffic. ✓

RESEARCH EFFORTS AT WORK

Already many agencies have been making sincere efforts. Virtually, all of them are now co-operating. The great Conference on Street and Highway Safety, which originated with Secretary Hoover, and which under his direction is using the machinery of the United States Chamber of Commerce, is a most important movement.

In various researches now in progress are co-operating officials of the Bureau of Public Roads, highway, railroad and utilities commissioners; police chiefs responsible for traffic regulation; the American Automobile Association composed of car users; the National Safety Council; steam and electric railway officials; taxicab operators; insurance organizations; automobile manufacturers and labor and women's organizations.

The conference is proceeding with the utmost harmony. It will map out general policies but still leave various organizations free to pursue those activities which they are best equipped to carry on.

Within the last year I have been in close touch with the work of all these organizations, and I know the outstanding features which are receiving consideration.

The subject is one of infinite length, and without precaution, this presentation might be unduly prolonged.

I shall, therefore, eliminate detail and strive to deal only with fundamentals, bringing to your attention only such issues as seem imperative.

I. THE NEED FOR ACCURATE STATISTICS

First would seem to come the compilation and publication of proper accident statistics. Before we can apply

the major remedies—education, regulation and punishment—it is vital to know why lives are lost.

Up to date there has not been much serious effort in this direction. Only eight states—Connecticut, Indiana, Maryland, Massachusetts, Rhode Island, Vermont, Virginia and Wisconsin—keep an adequate record of any accidents occurring on the street and highway. In these states the motorist is required by law to make a complete report of an accident to the commissioner of highways, the commissioner of motor vehicles, the secretary of state, or the nearest judicial official.

The report develops such facts as: time of accident, where it occurred, whether it was on a curve, road intersection, railroad grade crossing, etc., lighting conditions, state of the car, the age and sex of injured, and a statement of whether the accident resulted from fault of the driver or the pedestrian.

Governor Smith of New York recently deemed the subject sufficiently important to deal with it in a special message. He did not hesitate to say that the state of New York has been far behind the neighboring states of Massachusetts, New Jersey and Connecticut in efforts at prevention.

The governor powerfully argued that New York used 75 per cent of the revenues from automobile licenses, about twenty million dollars per annum, to meet the current expenses of the state, offering virtually nothing to safety development, thereby viewing the subject in terms of dollars without regard to protection of lives and property.

Because of superior methods applied by Massachusetts, said Governor Smith, fatalities in that state were reduced from 532 in 1919 to 500 in 1922, whereas in New York in the same period they grew from 1,361 to 1,725.

The logical outcome of this line of reasoning is that many deaths are pre-

ventable under proper regulation. We believe that this is a most helpful approach. It is our belief that eventually this statistical work will be centered in the United States Census Bureau.

An ideal form for registering these statistics will show automobile accidents, railroad accidents, street car accidents, injuries by other vehicles, as well as all other essential data. Then, as far as possible, effort will be made to draw the lessons and make preventive recommendations.

In a small way our own Traffic Planning and Safety Committee, operating through the National Automobile Chamber of Commerce, has striven to collect statistics with the help of the newspapers.

It is some satisfaction to report that we have found 256 American newspapers, operating in cities of more than 25,000 population, willing to file reports on furnished forms, giving the detail of every death from an accident in which an automobile figures.

These reports are filed with the National Automobile Chamber of Commerce, which has them analyzed and sends out a monthly bulletin showing not only the total of deaths and the causes, but making remedial suggestions.

It is our hope that as this plan continues to function it will make the newspapers of the country a clearing house for an enormous amount of valuable information having to do with safety. Of course we recognize that the Census Bureau can develop figures far more nearly complete than can any independent machinery.

II. COMMUNITY EDUCATION

Having developed the basic accident facts, the subject of education looms up as first in importance.

There are various phases of the edu-

cational work. From the standpoint of general considerations, the first thing should be to reach the great public and arouse an interest in the whole subject. Afterwards, education should be specific to various groups.

There are infinite ways of reaching the great public in an effort to arouse it to the imperative need of care. The methods which have been found effective in reaching these objectives include:

1. Newspaper and magazine publicity.
2. Posters on automobile windshields and in windows.
3. Motion pictures and lantern slides.
4. Radio talks.
5. Safety programs or addresses at meetings of various organizations including those of women.
6. Reaching parents through school children.
7. Special campaigns for a specified period.

Films and slides are a most effective means of presenting the safety story at any meeting. Such slides may also be shown at motion picture theatres before, during or after the regular performance. A list of safety films and slides available may be obtained from the National Safety Council.

Radio talks have been used to a considerable extent for safety instruction purposes. A number of broadcasting stations have placed on their programs safety speakers furnished by a local safety council or committee, automobile club, etc. Some thirty of the larger stations have also used safety talks on timely subjects, vacation hazards, Christmas, etc., furnished them by the National Safety Council and some of them have also used short safety "fillers."

Broadcasting directors are generally

willing to use safety material provided it contains definite information.

III. EDUCATION OF THE CHILD

No phase of traffic disaster is more dreadful than the killing of children, yet it is a most encouraging circumstance that the little ones seem to respond readily to traffic safety education. Everywhere that safety education is made a part of child training there is a decrease in the total of accidents.

It is recognized, of course, that there are limitations of time which operate against unduly adding to the already crowded courses of the public schools, but safety is so important that it is not likely that at any point will there be any real objection to such instruction.

Drills, lectures and moving pictures all will carry their lesson of safety to the child mind.

Playgrounds are needed to give proper release for juvenile energy.

The National Automobile Chamber of Commerce has long been alive to the importance of instructing the child and gives \$6,500 yearly in prizes for the best essays and for safety lessons by teachers and pupils. This contest is conducted by the Highway Education Board, and no less than a half million participated last year.

IV. EDUCATING THE ADULT PEDESTRIAN

We believe that adequately kept statistics will show that in a majority of automobile accidents the fault is with the pedestrian rather than with the automobile driver.

If anyone doubts this, he can prove to his own satisfaction a hundred times a day how frequent is the indifference of the pedestrian to his own self-protection. "Jay-Walking" has been accepted as a term to indicate those who

cross the street anywhere and with utter disregard of the traffic. It is only the alertness and skill of drivers that prevents an infinitely greater number of accidents.

Even where a pedestrian has the right of way, he should be watchful lest a car may pass out of control, as for instance on a slippery street.

If we could but instill the idea of precaution into both the motorist and the pedestrian, there would be almost instantly a most impressive casualty decrease.

V. EDUCATING THE DRIVER

We used to give high credit to a man for the skill to operate a stationary engine. Now millions of men and women, mechanically untrained, are operating fast moving vehicles on congested streets and highways. It is a situation for education.

I believe that 99 per cent of the driving is conscientious, yet we can further improve it with education. Every driver should properly be instructed in the laws of the road and the city street. He should also be trained rigidly in a due regard for the safety of the pedestrian. If the plans of our committee carry, we hope that eventually there will go to every purchaser of a new car a little booklet which will assist him in handling his car properly. This book is now finished and many manufacturers are presenting it to their customers.

The man who actually drives the car can apply the important lesson of courtesy on the road. He can be discriminating in speed. He can use brake, clutch and horn with judgment. He can eliminate reckless chances. He can avoid coasting on the dangerous hill. He can be cautious not to come up quickly at a crossing back of a car. He can be careful not to monopolize the middle of a road. He can avoid passing

while on hills and curves. He can take the maximum of care at grade crossings.

VI. DEVELOPING STANDARDIZED SIGNALS

Everybody concedes that one of the greatest needs is standardization of signals and regulations. It is also admitted that this is most difficult of accomplishment. What is legal in one city is illegal elsewhere. A course of procedure that might mean safety in one state would lead to fatality in another.

This need of uniformity is two-fold, as follows: (1) Signals to be made by the drivers themselves. (2) Signs and signals to direct traffic.

With regard to the first, the writer has very definite views. I believe that all the intricate attempts at driver signal systems are fallacious. I do not think that any set of hand signals can be perfected for general use which will infallibly indicate the driver's purpose to stop, back up or turn to right or left. Under the stress of excitement a driver may readily forget even an apparently simple system. Also, it is not always easy, while managing a car, to get the arm and hand exactly in the position to carry certain information to traffic behind.

In my judgment, the only thing to do is to thrust out the left hand as a sign of warning. This will act as a signal to slow up everything behind until the driver's intentions have been ascertained.

The question of the signals which shall guide the driver and regulate traffic involve a far more complicated proposition. Wherever there are standards generally accepted these should be followed. For example, I see no excuse for anything but green lights to permit traffic to go ahead, and red lights to stop it. Railroad practice has established this system throughout

the United States. Therefore, why trifle with it? If we could standardize the regulations for size, weight, speed, equipment, warning signs, etc., we should do a wonderful thing toward safeguarding human life.

VII. PREVENTION OF GRADE CROSSING ACCIDENTS

The grade crossing problem is one of the most difficult we confront.

Nineteen twenty-two saw a total of 1,714 killed at highway grade crossings which they had a right to cross. Trespassers on railroad property are excluded from this compilation.

A distribution of these 1,714 fatalities according to the class of vehicle or other cause is of interest:

Passengers in passenger automobiles.....	1,079
Passenger in auto buses.....	262
Motorcyclists or bicyclists.....	18
Passengers in trolley cars.....	2
Passengers in other vehicles or machines.....	119
Pedestrians.....	199
Miscellaneous.....	35
Total.....	1,714

It will be noted that 1,341 of these fatalities at highway grade crossings occurred to persons who were passengers in automobiles or auto buses. Automobile traffic may, therefore, be regarded as a contributing factor in nearly 80 per cent of the total highway grade crossing fatalities to non-trespassers.

In connection with these accidents I have no doubt that many railroads are called upon to pay large damages where they are entirely guiltless of fault.

It is easy to say that grade crossings should be eliminated, but the burden of the expense makes this impossible of quick accomplishment.

The fact that the grade crossing is the railroad's right of way should enforce the obligation of care upon the part of the motorist who uses it.

Railroads have been remarkably successful in cutting down accidents from other causes. If they could have the right measure of co-operation from motorists, the grade crossing menace would rapidly dwindle in significance.

Many remedies are constantly proposed. There are those who believe that the motorist should be compelled to make a stop before crossing the tracks, though it is conceded that such a law can be only partially enforced. It is also admitted that such a rule, if observed, would cause congestion and delay. Undoubtedly, there should be a compulsory slowing up to a limit of ten miles per hour within 300 feet of a railroad crossing. This would mean that a vehicle would be under control so that a quick stop could be made if necessary.

There is also general agreement as to the following outstanding points:

(1) The creation of new crossings should be avoided wherever possible.

(2) Highways which cross and recross tracks should be relocated.

(3) Adjacent crossings should be consolidated.

(4) Physical conditions at crossings should be favorable to the highway traveler.

(5) The proximity of railroad tracks should be designated by standardized, uniform and unmistakable indication.

(6) All extraneous signs and devices should be excluded from immediate vicinity of grade level crossings.

(7) Railroads should perform their full duty in giving notice of approach of trains.

(8) Crossing flagmen should be invested with authority to arrest persons disregarding stop signals.

VIII. SAFETY THROUGH CITY PLANNING

This subject concerns the engineer. So immense is its scope that it can but

be mentioned here. It has to do with matters physical, the arrangement of streets, the regulation of new buildings, the service of traffic routing.

It involves tremendous expense. It affects that which will be, rather than that which is. It concerns the future. It is the last of the remedies which will help solve the problem.

Therefore, I shall not attempt to discuss any of its infinite ramifications except to say that in the future parking on busy streets will be for limited periods if at all.

Many merchants, who formerly opposed any parking restrictions, are now coming to a changed viewpoint. Nothing is more certain in all the great cities than that there will be a constant tendency to eliminate parking.

America, however, has always met its problems not chiefly by restrictive measures, but through great accomplishments. We may expect in time to have huge parking buildings, more boulevards, decentralized cities, and other engineering developments to meet the needs of the motor age.

IX. SAFETY THROUGH HIGHWAY PLANNING

The committee on Traffic Control and Safety of the American Association of State Highway Officials is taking a far-seeing view of this phase of the work.

Its steady aim is the achievement of highways of 18 foot width, the betterment and replacement of present highways where necessary, the banking and widening of curves, the reconstruction of low capacity narrow bridges, the flattening of boulders and widening of fills, and the extension of the line of sight at dangerous curves.

X. CO-OPERATIVE ORGANIZATIONS

When we leave the strictly official regulation of traffic and enter into the

subject of co-operation on part of independent agencies, new possibilities are developed.

Every community should have either an individual or a commission responsible for its traffic, making studies of the volume and recommending methods for handling. Many such agencies exist at this time. Some of those that are particularly important naturally include the following:

Existing organized motor clubs offer an admirable nucleus for the furtherance of street and highway safety programs, because of their widespread interest in the cause of highway safety, their means and opportunity for obtaining publicity, and their community, state and national influence.

The Safe Drivers' Club is chiefly a medium for getting as many individual motorists as possible to take an active personal interest in public safety. The act of joining the Safe Drivers' Club usually consists of signing a pledge card, receiving a windshield or other emblem and, generally, paying one dollar or other small sum as membership dues. Such dues, where paid, go to the community safety organization and just about pay the expenses of conducting the educational campaign for membership in the club. The Safe Drivers' Club is, therefore, not a means of raising money for the conduct of community safety work, but is chiefly an educational enterprise, self-supporting at the best, for securing the interest and co-operation of motorists.

Highway Safety Committees in a considerable number of cities have been organized under this name or as "Vigilance Committees" to assist the police department, by a variety of methods, in reporting or discouraging violations of the traffic laws and ordinances.

In many cases such organizations as the National Safety Council bear the brunt of the work for traffic safety and

furnish a focusing point for creating and enlightening public opinion to aid officials in their performance of accident prevention duties.

Safety programs, which at various meetings aim at interesting as many as possible of the civic, commercial, fraternal and professional organizations, are very helpful.

Safety Education Week has been another form of popular presentation which has done much to drive home the safety lesson.

The community safety organization is a promotional body having no legal authority or responsibility. It encourages and supports, through the power of public opinion, the police department and other public officials in the proper discharge of their duties. It helps to secure, for these officials, a sympathetic and intelligent public understanding of existing or proposed legislation, traffic control methods, and similar measures for the public welfare. It seeks to harmonize by friendly conference the conflicting views of various groups in the community, which might otherwise prevent or delay needed improvement. It is a convenient and effective medium for carrying on many of the specific educational activities which have been mentioned or for lending support to any such activities which may be carried on by any of the organizations or groups working in or with the safety organization. It encourages all possible safety activity on the part of other organizations and forces in the community.

XI. VIGOROUS PUNISHMENT FOR TRAFFIC OFFENDERS

Most of the considerations that I have here discussed are educational in character, but we know that there are many cases where the remedy does not rest in education.

The statistics of Massachusetts and

Maryland indicate speeding as a major cause of automobile accidents, 158 out of 522 deaths being reported as so caused. Intoxication was the cause in 10 per cent.

Why any mercy should be shown to this type of offender is something that the automobile industry does not understand. The fear of God should be put into every murdering criminal. This cannot be done by fines. The heedless pay these fines and dismiss the matter almost as a joke. Judge Bartlett of Detroit has expressed the opinion that only jail sentences stop the reckless driver.

The automobile industry believes in the rigid enforcement of all traffic regulations. It pledges its full support to every judge who imposes jail sentences for proved offenses, no matter how severe may be the penalty. We believe also in the suspension or revocation of license as a penalty.

In fact, we have reached the point where we are willing to recommend what may be regarded as perhaps the most drastic penalty yet imposed.

We propose that when, after due process of law, a driver of a passenger car is proved responsible for a serious accident or death, that in addition to all penalties now imposed, that he should forfeit possession of his automobile for a period to be determined according to the seriousness of offense. We believe that it is not enough to take the license. Take away the car too. There seems to us something right and fit in making the punishment follow the car.

This punishment could hardly with equity be applied to the hired driver of a taxicab, a motor bus, or a motor truck, since this would impose an unfair financial loss on his innocent employers. Generally speaking, these are not the drivers who figure in accidents. No exception should be made in favor

of any who own vehicles they drive, whether these be passenger vehicles or commercial vehicles.

It is stated by some that such a procedure is confiscation and would be unconstitutional. We do not agree with this viewpoint. It is present legal procedure in all parts of the country to take from a man that which he has used to the detriment of the public. Thus, we find police authorities everywhere confiscating murderous weapons, gambling devices, illicit liquors and conveyances used for the transport of such liquors. We have seen property taken from raided saloons. We have seen homes and business establishments padlocked when they have been used for disorderly purposes. If all this be legal, we believe that our suggestion of impounding cars is legal.

But, if this cannot be done under present laws, we recommend that the various state legislatures enact laws to provide for such impounding. Many a man who would be indifferent to a fine would miss his car most keenly.

The point might also be raised that the care of impounded cars involves a problem and that it might be difficult for police authorities to find adequate storage space, or to assure return of the cars to their owners in first-class condition.

Our plan does not involve any municipal pound. We can do one of two things: either tie up the car in the owner's garage with police seals attached, or impound it in a public garage, at the owner's expense, also with police seals attached. At the end of the penalty period, the police department would remove the seals and permit the car to be returned to use.

QUESTION OF LICENSE BY EXAMINATION

Upon the suggestions that I have already made, opinion in the automo-

bile industry is largely in agreement. These points also represent the views of most of those who have been studying the situation, since the motor vehicle business, in making its recommendations, has consulted with city, state and highway officials for their experience and conclusions.

Other remedies have been proposed that raise sharp differences pro and con. For example, there are strong proponents and opponents of the idea of licensing drivers only upon examination tests. It has been claimed that compelling the driver to prove his efficiency has a marked tendency toward the reduction of accidents, and Massachusetts is quoted as an example. Others believe that the use of the highways in a lawful manner and in a lawful vehicle is a right and not a privilege. There is the further complication that in many cases four or five members of the same family drive a car and obtaining licenses for them all by examination is a process that is more or less resented.

My own feeling is that, while fundamentally the idea is sound, the enormous number of applicants for licenses makes it almost an impossible proposition to give anything but the most perfunctory examination. It would take limitless time and thousands of examiners to attempt to pass on the competency of all those who wish to drive.

AGAINST COMPULSORY LIABILITY INSURANCE

Of late there has also been an increasing tendency to suggest compulsory liability insurance as a panacea. This demand calls for provision by law so that in case of accident there may be available adequate compensation for the sufferer.

Whether such a plan would work out is a question. It does seem fundamentally unfair that the victim of an

accident should have no power of recovery because the offending driver has no assets.

But any attempt to correct this injustice, by making compulsory liability insurance a prerequisite to the issuance of a license, might lead to worse injustice. It is doubtful whether such a law would reduce automobile accidents. Careless drivers might shelter under the protection of this insurance, and be still more reckless.

It would undoubtedly be a step toward socialism and would provide new obstacles against the enjoyment, convenience and profit of individual transportation. It would increase the cost of motoring to many worthy persons who are now careful drivers. In fact, the additional cost would deprive many of the ability to own an automobile.

Particularly would this work injustice against the farmer. Actually, there is little need of protecting the public against the farmer driver, for he is in most cases a very careful motorist.

The automobile industry has not up to this time been able to convince itself of the equity or the efficiency of

compulsory insurance as a safeguard to traffic.

A UNIVERSAL OBLIGATION

I have given here a general summary of the problem and outlined methods to meet it. Each man can render some aid.

We are unworthy to share the benefits of civilization unless we do our utmost to safeguard our people from such perils as its machinery develops unless properly controlled.

Twenty thousand men, women and children will die on street and highway in 1925 unless we effectively intervene.

Protection of the public ways entails a peculiarly democratic obligation.

Onto their surfaces of asphalt, brick, concrete, clay or macadam empty daily the nation's units, greatest and lowliest, proudest and humblest, richest and poorest, strongest and weakest.

Over their crowded routes, whether afoot, whether by mass transportation in the electric trolley or individual transportation in the gasoline automobile, all must pass on the way to home, to toil, to education, to pleasure, to all the myriad activities of life.

We have done ill until this universal transit be freed of danger.

Traffic Violations and the Court

Detroit's Violation Bureau

By SOLON E. ROSE

Detroit Bureau of Governmental Research

IN many urban centers the motorization of traffic is substantially complete. In Detroit and Los Angeles, for example, there are as many automobiles as families and there is an automobile seat for every person. This replacement of locomotion by "motor-motion" means that most of

our citizens are now operators of automobiles (which are potentially dangerous weapons) and as such make a large use of public highways both as traffic channels and storage spaces. It is essential, therefore, that, from both the standpoint of public safety and to secure the impartial and

efficacious use of public highways, a comprehensive code of regulations be taught the public and be strictly enforced.

Public interest in reasonable traffic regulation is reached through wide dissemination of the printed statutes, press articles, lectures, instruction in the schools, special schools for drivers, and the examination of applicants for operators' licenses. Enforcement of these regulations is being carried out by the apprehension of offenders by the police departments, and the trial and punishment of offenders by the criminal courts. The detection and apprehension of offenders is or can be well taken care of by the use of a sufficient number of traffic and motorcycle officers, but the trial and punishment of thousands of petty offenders by means of the elaborate and expensive machinery of the criminal courts has placed a burden on these courts that they are in most cases unable to handle without costly expansion. However, inasmuch as judicial action in the disposition of these cases seldom goes further than the imposition of a nominal fine, the expansion of our courts to handle such appears unwarranted. The problem of an expeditious disposition of traffic law violations is faced by all our urban communities.

CREATION OF "VIOLATION BUREAU"

The penalization of offenders has heretofore been exclusively a matter of court jurisdiction, although about 98 per cent of traffic offenses are of so minor a character as to make this procedure somewhat ridiculous from a practical viewpoint. Recognition of this absurdity, coupled with the emergency of an overburdened court in which hundreds of violators and scores of policemen fill court rooms and halls to overflowing on "Traffic Violators days," has caused Detroit

to create a "Violation Bureau" at Police Headquarters to dispose of most of these cases without court action.

In Detroit in May and June the average number of traffic violation complaints was about 300 per day, with many violations overlooked or disposed of by reprimands because of the practical impossibility of following up a larger number, and the reluctance of police officers to spend an excessive amount of their free time in court. Even with this number, conditions were very unsatisfactory, not only because of the court congestion, but also because a large number of the officers were kept in court away from active duty or on their own free time, and because of the great inconvenience caused the citizens who were kept waiting from three to five hours for their cases to be heard.

On August 1, 1924, a new "Violation Bureau" was established to serve:

- (1) As a clearing house for all traffic violation complaints.
- (2) As a record for all traffic offenders.
- (3) To dispose of all cases where the plea was guilty and judicial action was not indicated as necessary or heavy penalty desirable, and
- (4) To send to court all serious cases and the cases of "repeaters" where the imposition of nominal fines had proved futile.

To carry out this project, a new type of card for reporting traffic violations was put in use. These cards are made out in duplicate, the original being given to the offender or attached to his vehicle, and the copy forwarded to the violation bureau. One side of the violation card is reproduced.

These cards are issued to the officers, and individual receipts taken, so that

Card No.

DETROIT POLICE DEPARTMENT

TO THE OFFENDER:

You are directed to report within 24 hours (Sundays and Holidays excepted) at the Violation Bureau at Police Headquarters, Beaubien and Macomb Streets. Office Open 8.00 A. M. to 10.00 P. M.

IF YOU FAIL TO SO REPORT A WARRANT MAY BE ISSUED FOR YOUR ARREST AND YOU WILL BE REQUIRED TO ANSWER TO THIS CHARGE IN COURT.

BE SURE TO BRING THIS CARD AND YOUR DRIVER'S OR OPERATOR'S LICENSE WITH YOU.

LIGHTS

Overtime	Both headlights out
Improperly	One headlight out
In prohibited zone	Tail light out
In street	Glaring headlights

HORN

.....Within 15 ft. of fire hydrantBlowing horn except for signal

CUT-OUT

..... Opposite safety zone Muffler cut-out open

.....In front of building entrance

LICENSE PLATES

.....Missing

FAILURE TO STOP

.....Obscured or dirty

.....At stop street

.....When leaving alley or driveway **DRIVING LICENSES**

.....With street carNo operator's license

.....Operator's license not on person

DRIVING THROUGH No chauffeur's license

..... Occupied safety zone Chauffeur license not on person

.....Street to left of street car

SPEEDING

.....Miles per hour

.....Exceeding half legal rate at RECKLESS DRIVING

street car linesEndangering pedestrian

..... Exceeding half legal rate Car not under control

..... Exceeding main legal limit	.....
..... turning corners	..... Violating right-of-way

Violation other than above, if any.....

Place where violation occurred.....

St. At. St.

Ave. Near

Patrolman..... Badge No.....

all officers can be held accountable for all cards used.

The reverse side of the card carries the following instructions to offenders:

TO THE OFFENDER:

When you appear at the Violation Bureau—

1. If your record for the past year has been satisfactory, you will be allowed to pay a sum of money or if you prefer, to go to court to stand trial for your violation. If you make the requested payment it will be turned into the general fund of the City in the same way as if it was a fine collected in Court, and there will be no further action taken against you.

2. If you are not guilty of the violation charged or if for any other reason you care to pay the sum required, you must appear in Court for trial and must wait at the Bureau until you are served with a summons to appear in Court.

3. If you, although guilty of the violation with which you are charged, refuse to make the requested payment because you prefer to go to court for trial, the fine imposed by the Court may be more or less than the deposit, or you may be sentenced to the House of Correction or you may be sentenced to both fine and imprisonment, in accordance with the opinion of the Court.

4. For subsequent offences, either (1) a greater deposit will be required, or (2) you must go to court without the option of making a deposit.

5. The amount of the required deposit varies with (1) the type of violation, and (2) the number of violations. The minimum amount is \$1.00 and the maximum \$10.00.

The duplicate copy of the violation record is the same on its face as the original, but the reverse is used as a memorandum by the reporting officer, as follows:

DETROIT POLICE DEPARTMENT

VIOLATION BUREAU

PATROLMAN'S REPORT

To be filled out only in those cases that may go to court

Defendant.....
 Address.....
 Owner of Vehicle.....
 Address.....
 Style of Vehicle and Make.....
 Operator's License No..... Car License No.....
 Violation.....
 Remarks:.....

WITNESSES

Do not write here.

Receipt No.....

Summons

Issued:.....192..

Warrant

Issued.....192..

.....
Officer Making Complaint.

.....
Officer in Charge.

The reverse side of the duplicate card is filled out only in cases of serious, unusual, or flagrant violations, for which the offender may be sent to court for trial. When the officer making the complaint has completed his record and turned the card in to his precinct, he is not required to give any further attention to the case, unless notified by the Violation Bureau that he will be required to appear in court. This notification to the officer is made by returning to him the violation card he sent in and the court notice issued by the Violation Bureau.

The card served upon the violator directs him to report to the Violation Bureau. When he appears at the Bureau, he is, except in the more serious instances, permitted to make payment according to a fixed schedule or if he so desires, he may go to court for trial. If the offender prefers to go to court, he is forthwith served with a court notice. In the first month of operation, no one who was given this option of making payment failed to take it.

When the payment is made, a receipt is issued as below:

This receipt is made out in duplicate. One copy is issued to the offender when he makes payment and the other is filed as a check on the money received. The money is forwarded daily to the city treasurer. The accounts are audited monthly.

This system in effect permits the offending citizen to fine himself to serve his own convenience and the convenience of the public departments concerned. It was put into effect after an understanding was reached with all the officials concerned, including the judges of the criminal court and the legal departments of the city and county. It has, as yet, not been sanctioned by the passage of a city ordinance, but this will probably follow in the near future. An informal approval of this scheme was obtained from the City Council prior to its being placed in operation. It is evident that at present these orders of the police are not legal summons and that offenders may ignore them at will. However, such procedure would result in the issuance of a summons personally served. During the introductory period an expected number of these orders

DETROIT POLICE DEPARTMENT

VIOLATION BUREAU

\$.....00

Operator License No..... Date.....192..

Received from.....

.....Dollars.....

Re-Violation Card No.....

F. H. CROUL,
Police Commissioner

Date.....

Violation.....

Officer's Name.....

By.....

I hereby forfeit to the City of Detroit the sum of \$.00 for the violation described hereon in lieu of going to court.

Name.....

Address.....

were ignored. Such cases are now being followed up vigorously by the police. The new system has had the support of the press and has been given full publicity.

RESULTING BENEFITS

The first month's operation of the Violation Bureau showed that the Police Department made 17,034 complaints against motorists during the month as compared to 9,338 in July. The Bureau handled 12,681 cases and collected \$32,909 in the nature of fines. The courts have been relieved almost entirely of the burden of hearing traffic cases and enabled to give more time to criminal cases. In July, 5,630 traffic cases were tried, while in August only 224 were sent to court. Under the old system traffic law violators averaged three and one half hours in court awaiting trial. The average time for settlement of such cases in the Violation Bureau is less than five minutes. Police salaries should go into keeping officers on the job. During July over 300 police officers spent a total of 1,050 hours in court awaiting the hearing of traffic cases, but in August the officers spent only 45 hours in court. This means that busy congested corners had increased police supervision and that motorcycle officers kept closer watch for violators. Everyone concerned has been benefited—the courts, the police, and the violators.

The Police Department has made every effort to play fair with the public and in about 8 per cent of the com-

plaints, where a substantial doubt existed or a warning seemed the only action warranted, the complaints were withdrawn. However, only the chief of the Bureau is empowered to withdraw complaints. Omitting the withdrawn complaints, 98½ per cent of all the rest were settled by payments to the Bureau and 1½ per cent were sent to court for disposition. This ratio is 57:1. The whole number of cases handled would have averaged 550 per day for the court, which would have more than taken up all the time of one judge and his court room staff. Whereas, with the sifting out and disposition of the unimportant cases by the Bureau, only the equivalent of one day's time in a month was consumed by the court.

To summarize the results obtained, the Bureau has:

- (1) Relieved congestion in the traffic division of the criminal court.
- (2) Done away with the holding of large numbers of police and traffic officers in court, waiting to testify, away from active duty.
- (3) Relieved accused drivers of long waits in crowded court rooms, which usually constituted more of a punishment than the penalty imposed by the judge.
- (4) Instituted a more complete and unified record of all traffic offenders, so that "repeaters" can be more heavily punished.

The Automobile and the Police

By ARCH MANDEL
Dayton Research Association

IN so far as the police department is concerned, the automobile has not proven itself an unmixed blessing. While, on one side of the equation, it has added a means of improving the effectiveness of police departments, it has, up to date, added more on the other side of the equation to the difficulty of the already difficult and complex problem of crime prevention. Tradition plays a very strong part in the administration, methods and operation of American police departments, and it has been a slow process to bring about the required adjustments necessary to meet the changing conditions resulting from the universal use of the automobile for dishonest as well as honest purposes.

Certain crimes and various phases of disorderly conduct may be considered as being directly preventible by the police. The presence of a protective force will prevent the commission of a burglary or a holdup or minor disturbances against the public peace. To prevent this type of crime or misconduct, policemen are assigned to patrol definite districts or beats and are made responsible for the peace and order in the districts assigned to them. The more frequently a policeman can cover every point on his beat, the more effective is he as a crime prevention force. Inasmuch as the amount of territory a policeman may have under proper surveillance is extremely limited, the foot patrolman is handicapped very seriously in his ability to prevent crime.

As a rule, the patrol beats in the business sections are small, so that the policeman finds it possible to traverse it with sufficient frequency to be of serv-

ice if necessary, but in the residential sections, the patrol beat is too extensive for the policeman to be of any real value. Except for the misguided belief of security that citizens have, the use of a foot patrolman in the residential sections is practically nil.

ADVANTAGES OF AUTOMOBILE PATROLLING

The obvious answer to this problem has been to employ a sufficient number of policemen and to reduce the size of the beats to a workable unit, but for financial reasons cities have been unable to cope with the situation by this method. With the advent of the automobile, however, police departments have been provided a means of making the patrol method a greater force in the prevention of crime. The introduction of automobiles in this service has made it possible to do better work over a larger territory, with the same number of men patrolling. The advantage gained from the use of automobile patrolling is either a reduction in the number of men in the patrol service or, because police departments are usually undermanned, the advantage to be gained is covering the territory now assigned to foot patrolmen more frequently.

The usual method of employing the automobile in patrolling is to assign two policemen to a car, who drive at a rate of speed consistent with ability to observe, in passing, conditions on the beat. When circumstances warrant a closer investigation, the automobile is stopped and one or both of the men proceed to investigate more closely. In this way, all of the advantages of

foot patrolling are obtained, to which is added the advantage of frequent surveillance of every part of the beat. The superintendent of the Detroit police department, in his request for an appropriation for motor equipment for patrol service, stated to the Common Council that two men in an automobile were more effective than six men on foot.

By the use of the automobile in patrolling service, the policeman is given an even chance in coping with the criminal. The latter realized early the unusual advantage of using an automobile in his business and unless a policeman is able to travel as rapidly as the criminal, he stands little chance of apprehending or investigating suspicious characters who operate with motor equipment.

It is not necessary in order to be a preventive force that the policeman be on the spot at the time. It is sufficient if he has the means of arriving quickly and unsuspectingly in any part of his beat. This the automobile makes possible.

Another benefit accruing to the public from the common use of motor equipment by policemen is the emergency aid possible to be rendered with equipment that can be carried in automobiles: A first aid kit for injured persons, lanterns for marking dangerous places which have not been reported, fire extinguishers, heavy firearms, and a score of other implements that the policeman may find useful in his task of coping with criminals and in being a general handy man to the community.

The proverbial criticism against police departments has been that a policeman is never available when he is needed. With the extensive territory a policeman must cover, it is only by a fortunate coincidence that one will pass the door or be on the block when he is wanted. For example, in one city of sixteen square miles, with fifteen

foot patrolmen assigned to as many beats on the night shift, it is evident that some definite means had to be provided to make policemen available within a few minutes after a call. The motor vehicle has solved this problem.

An increasing number of cities are erecting patrol booths in their outlying sections, from which point of vantage two men, as a rule, equipped with a motor vehicle, operate. One remains in the booth at all times to receive telephone calls, while the other patrols the vicinity. Within a few minutes after a call arrives, help can be had by the citizens in the district limits covered by the particular booth. This method has been found very practicable and very efficacious. With the required number of booths strategically located throughout the city, good police protection is secured. Through immediate availability of policemen placed on the main highways near the outskirts of the city, the police are enabled to close all avenues of escape for criminals who "pulled off" a big job in the city or to apprehend those who are escaping from a job in another city.

In conjunction with automobile patrolling and the patrol booths, high-powered machines called "flyers" are maintained at the precinct stations with men on duty ready to respond to calls, particularly of a more serious nature, such as bank holdups, robberies, etc. This service is analagous to the response of fire departments to fire alarms. And the trail of serious crimes committed during the last few years with the aid of the automobile is striking evidence for the need of police departments to be at least as well equipped as the criminals.

PROBLEMS ATTENDANT IN MOTOR'S WAKE

(1) *Holdups.* The motor vehicle has ushered in a new era of crime and

police problems, and apparently, a new type of offender. It is a dull day when the newspapers do not carry accounts of banks held up or payroll robberies in some part of the country. Where formerly criminals did not dare to venture the invasion of the central parts of cities, it is not uncommon now to have these holdups committed in business sections in broad daylight. And the successful escapes from the scene of the crime before the police arrive do not help to diminish this banditry.

When it is realized that in a few minutes a bank may be held up and an escape practically assured, it is surprising that there are not more crimes of this type. From the records, it must be concluded that criminals are not deterred by the possibility of being caught in the act; but, if deterred at all, it is because of fear of capture afterwards. State lines have been eliminated by the automobile. Detection of criminals is becoming more and more a nation-wide task. In a ride of a few hours criminals can come from distant cities or from neighboring states, commit a crime and disappear while the local authorities are gathering the details of the crime. In the city of Detroit a few years ago, at the busiest point in the down-town section, a robbery of a financial establishment was staged at nine o'clock in the morning. The criminal not only escaped with loot, but killed two policemen on the spot and wounded another for life. The streets were full of people, but the marauders disappeared. Fortunately, they were apprehended a year later.

(2) *Theft.* However, the increase in this type of crime is not the only problem added to the policing of our cities. The theft of automobiles, aggregating millions of dollars annually, seems to be a new crime added to our already large category of criminal offenses. Whether those engaged in automobile

stealing would have entered a career of crime it is difficult to say, but it does seem reasonable to assume that the opportunity, presented by the apparent ease with which automobiles can be stolen, has induced many individuals to attempt to gain a livelihood by this method, individuals who otherwise would not have undertaken the commission of more difficult and more hazardous crimes, such as burglary and housebreaking. To cope with this problem, police departments have been obliged to detail special squads and to establish special bureaus for recovering stolen automobiles. This has added to the cost of operating police departments in those cities where funds were available for employing more policemen, but, in other cities, it has meant a reduction in the number of men assigned to the performance of the usual duties.

(3) *Traffic Congestion.* It is unnecessary to describe in detail the traffic problems created by the universal use of the automobile. Our city streets were not planned for storing miles of automobiles, providing, at the same time, facilities for a continuous stream of traffic. The result has been the adoption of elaborate rules for controlling and regulating this undreamt of traffic. To enforce these rules requires policemen, and it has been a case of either detailing men from the routine crime preventive duties to traffic regulation or to increase the personnel of the department. Where the latter measure has not been possible, it has meant the subtraction of men for traffic duty from a force already inadequate for crime prevention. And even in those cities where additional policemen are available, the crime-prevention function suffers because the public, by its failure to regard the expenditures for traffic control as separate from those for the old line duties, denies

sufficient funds to meet the need of a growing city for increased crime prevention facilities.

(4) *Loss of Life and Accidents.* In the hands of irresponsible people, the automobile is a deadly weapon. Upon the police, as a community agent responsible for the protection of life, has fallen the overwhelming task of preventing the almost wanton killing and maiming of men, women and children. The police department of Detroit has created a bureau of accident prevention, employing twenty policemen who do nothing but investigate thousands of accidents occurring in that city annually. These new functions call for reorganization in police departments, both as to methods and type of personnel. To some, it is a question whether regulation of traffic and the promotion of traffic has not become a sufficiently serious problem to be handled by a distinct department separate from the police, headed by men whose time and attention can be devoted to this alone and who will attack the problem scientifically. It is inevitable that

the crime prevention and protection functions of the police department should suffer so long as the money appropriated to police departments will, with increasing amounts from year to year, be devoted to traffic regulation. When from 10 per cent to 20 per cent of the men and money of a police department is devoted to traffic control, it is important that the sums appropriated to police departments be analyzed by or for the public.

Living has been accelerated by the automobile. This acceleration, from the standpoint of police departments, has made old problems more complex and difficult and has created new ones. With time and distance practically removed, police problems have been extended from local to metropolitan responsibility. If police departments hope to meet the new conditions with any degree of success, they must readjust themselves more quickly than has been their habit or inclination in the past and they must realize that traditional methods and organization are ineffective in a rapidly changing society.

Protective Measures for the Automobile and Its Owner

By E. AUSTIN BAUGHMAN

Commissioner of Motor Vehicles of Maryland

"**P**ROTECTION to the automobile owner" means laws and regulations which at times are bound to be thought irksome to the automobile owner.

This thought should always be borne in mind when the subject of automobile laws is being considered. By this method, greater co-operation will be obtained and better laws enacted. Any law, to be effective, must have penalties; it must have "teeth in it," and these teeth cannot but at times

bite down upon some person who would lose his or her protection from criminally and habitually reckless operators, if the teeth were not there as a deterrent. To "draw the teeth" of any law leaves the criminal unafraid to pursue his way undisturbed—to steal cars, to drive while drunk, to run over and maim or kill other persons and then speed away. Thus, automobile regulations must be put under the heading of "criminal laws." This fact makes the matter of automobile regulation the

more difficult because the vast majority of violators of an automobile law are not criminals in the accepted sense of that word. And yet, they must, with what good grace they can muster, bow to the penalties in the law when they innocently or inadvertently violate its provisions,—this that the law may be made a real instrument for good and not become obsolete through partiality in enforcement.

Motor vehicle control must be grounded upon four essential requirements. Although continued expansion of motor vehicle traffic may require enlargement of regulatory power, experience leads to the belief that these four requirements are basic and essentially permanent.

PROTECTING THE AUTOMOBILE

Proper and effective regulation and control requires that a close check at all times be kept on the individual car, once it has been identified and recorded at some central place and under official supervision of records. This record of the car as it goes into the "used-car" class must be permanent. Ready identification and a maximum of ease, in tracing to its owner any car seen on the highways, must be provided. Before being turned loose on the highways the driver, for the protection of himself and to safeguard others, must undergo some mental test and in addition give practical demonstration of his ability and fitness to drive. Once permitted to operate, the driver at all times must be easy of identification and location.

These ends are best accomplished, I think, in the following manner:

First, there must be a titling law; *second*, the ordinary system of yearly registration and issuance of a numbered metal tag to be displayed on cars; *third*, each chauffeur or operator must submit to mental examination and give practical demonstration of his

or her ability to operate a car; and, *fourth*, every driver should be assigned a numbered permit to drive without which he cannot operate a car.

The title law, although it is mentioned first in chronological order, constitutes the latest addition to the more modern systems in the progressive states of the Union. In addition to its other advantages, it has done much to check automobile thefts. It has made the "auto Jack's" vocation more hazardous and correspondingly less profitable. Under this law, if properly drawn and stringently enforced, no motor vehicle can be bought or sold without there first having been an exchange of a title deed between vendor and vendee and a centrally supervised recording of this deed. This title deed should contain a description of the external characteristics of the car—its type of body, type of wheels, etc.—as well as the original factory-given number of the engine or motor.

Being originally designed to prevent theft, such a law should have the most stringent and severe penalties possible. The engine number, as a permanent method of identification, must be protected from forgery or change. Penalties including jail sentences, in addition to fines, should be provided for the mere having in possession of a motor vehicle whose identifying numbers have changed, been destroyed or obliterated. Forgery in application for a title, misstatement in application or any unofficial alteration of a title must also be guarded against through severe penalty clauses. That owners must be made to protect themselves, penalties must be provided for "having in possession" a car for which no title has been issued.

All titles should be issued by, and a record thereof kept in the office of, a state official, who shall have power to enforce the provisions of the law.

Under this system, as introduced first in Maryland, and subsequently adopted by other states, every motor vehicle can be traced at all times to its original owner. In addition, the current owner's name and address will at all times be a matter of public record.

Properly administered, a set of title records will give the authorities at all times a complete and permanent description and record of the present ownership and approximate location of every motor vehicle in a state.

The title record should be kept independent of the system of yearly registration of all cars and the issuance of numbered identification tags, which should be required to be displayed on the car at all times. These tags, issued for a specified car, identified by its body design and engine number, must not be allowed to be displayed on any other car. They should not be issued except in the name of the person who is the owner of record of that particular car. With the tags should be issued a "registration certificate," which the law should require to be carried in the car at all times, thereby immediately establishing the fact that the tags displayed were not issued for some other car. This system at all times gives to its owner speedy identification of and ease of tracing any car seen on the highways. It assures all motor vehicles being made easy of identification and location, through the name and address of the owner of record, after an accident or traffic violation.

PROTECTING THE OWNER

In such cases as just mentioned, however, it is oftentimes the driver rather than the owner who is wanted by the authorities and the complainant. Therefore, all regulatory statutes should endeavor, first, to keep all persons from behind the steering wheel and away from the gear control of a motor vehicle

until he or she has demonstrated ability to operate a car, with the minimum of danger to others, and, second, has also shown a working knowledge of traffic regulations and "rules of the road."

Accomplishment of this, to the desired end, is best reached, I think, through the issuance, first, of a "beginner's license" or "instruction permit." Under this permit the new driver should be forbidden to operate a car unless a fully licensed driver, of experience, is on the driving seat beside him. This permit should be good only for a limited period, but should be renewable during the time the applicant desires to continue undergoing driving instruction.

After the above prescribed period of instruction in actual operation of a car, the applicant should report to the licensing authority for an examination. First, there should be an oral test to determine what the would-be driver has learned about the law and what his conception of his own and other's rights are on the highways. Passing this test, the applicant should be given immediate examination as to his actual driving ability. Failing in the oral examination, he should be told to study the law and come back at a later date for re-examination.

With an officer of the state on the seat beside him, he should be compelled to actually demonstrate his driving ability. This driving ability should be demonstrated in fairly heavy town traffic and not out on an open and otherwise deserted highway. Only after passing both tests should a license to operate be given.

There should in all cases be a prescribed minimum age for all drivers. This should not be under sixteen years.

Having set a standard that drivers must meet before being allowed to operate, the state should list and index every chauffeur and operator and issue

him a numbered identification card containing his name and address and physical characteristics. The operator should be compelled, under threat of a severe penalty, to carry this card with him at all times while driving and to show it upon demand, following any violation or accident.

These permits, if they are to be used properly, must be subject to suspension or revocation. The listed index of driver's records should at all times be kept up to date. In addition to the entry of suspensions or revocations, there should be kept, through co-operation between the highway patrol officers and the trial magistrates, a

complete record of all fines and other penalties imposed. In this way, each driver's record of conduct, and a determination of second or subsequent offenses is made constantly available.

Over and above principles and requirements in the theory of motor vehicle control, because these are useless and practically unenforceable without them, is a body of uniformed, trained and motor-mounted police highway patrol officers. The psychological effect of such a force in restraining the potential "speed king," in discovering and recovering stolen cars, etc., is beyond estimating in its value.

APPENDIX

THE TITLE LAW IN MARYLAND

In the year 1919, the climax of an epidemic of car stealing having been reached, it became absolutely necessary to afford some additional protection to the motoring public. In order to do this, the popularly known "Title Law" was passed by the Legislature of 1920, becoming effective June 1, 1920.

The law had been in effect only six months when the results became apparent, as evidenced by the following table:

Year	Cars stolen	Recovered	Missing
1917	556	347	208
1918	635	526	109
1919	922	709	213
1920	596	417	179
1921	602	525	77
1922	784	715	69
1923	1,350	1,293	57

From these figures, it is apparent that in 1920 the theft rate was practically cut in half, and that the number in the missing column grows steadily smaller year by year, despite the fact that there has been a 20 per cent increase yearly in the number of cars on

the street since 1920. During the past year there have been an unusually large number of cars stolen, but these have been quickly recovered, only 57 remaining out up to November 1, 1923. Most of these thefts are directly traced to joy parties who take cars for a night's ride and then abandon them on the road, or to the bootlegger or thief who takes them for the trip only.

The Title Law was enacted primarily to prevent the theft of motor vehicles and the disposition of stolen cars in Maryland. That it has been responsible in a large measure for the condition of security now felt and enjoyed in Maryland is doubted by no one.

Not least among the advantages of the Title Law is the legal protection afforded both the buyer and the seller. The law provides that the vendor must give the vendee an assignment of his title, together with a statement of any liens or encumbrances against the motor vehicle. Under this law the buyer is assured of a clear title, while the seller of a motor vehicle under a time sale has the same assurance that the car cannot be sold to anyone else

without a statement of his lien appearing on the assignment. This feature of the law is especially advantageous to every dealer and finance company. This statement will be clearer when the following fact is taken into consideration. Approximately 60 per cent of all cars titled in Maryland are bought on time sales. These statistics were compiled by the writer from cars titled in Maryland and the District of Columbia, and I have no doubt that they are about the same in any section of the country. The title files are consulted daily by dozens of persons for as many different reasons, and every mail brings requests for information of a like nature. Some of these inquires are from people who have been in accidents, and have secured judgments against car owners. Others are from persons and firms holding liens on certain motor vehicles, and still others from trustees and receivers in bankruptcy who are trying to straighten out tangled assets. Credit men and finance companies are tireless in their queries, and the latter have every reason to be. And, finally, the title files are invaluable to the police departments and insurance companies, both of whom are its greatest users.

The Title Law has been advantageous in another respect, and that is from a statistical point of view. From the engine number files one can in a comparatively short time find anything from how many 1912 Cadillacs are still in existence in this state, to how many more Fords were sold than Chevrolets in 1923 or 1922; and from how many six- and seven-ton trucks are still in use in Maryland, to what percentage of cars stolen in 1923 are still missing.

I think the question asked most often of the Filing Department is "Find out what John Doe did with that Lizzie he used to own."

One of the most significant facts to be noted about the Title Law is that after noting the beneficial effects in this state, a number of other states have adopted a title law. In most instances the law is modeled upon the Maryland law and is practically identical with it. The chief exception to the above is the state of Pennsylvania, which has some excellent additions to the Maryland law. At the present time the following states have a title law: Michigan, Indiana, Virginia, Delaware, Missouri, North Carolina, Florida, Pennsylvania and Maryland. Ohio requires that a bill of sale pass between the vendor and vendee. Maryland is particularly well situated in that her four neighbors all require proof of ownership before a motor vehicle can be sold within their limits. The ideal condition will, of course, arrive when every state has adopted a title law, and the auto Jack is driven to abandon his profession for the reason that the market has been taken away. If there were none to buy stolen cars, the stealing would stop almost overnight. As it is, the average car thief is beginning to feel the pinch of the law. The game "isn't what it used to be." The thief in Maryland is confronted with the Title Law every time he tries to dispose of his ill-gotten goods, and should he try to take it out of the state, he is faced with the Federal Act forbidding the interstate transportation of stolen cars.

The proof of the pudding is in the eating. In 1923 1,350 cars were stolen and all but 57 were recovered.

The Automobile and Community Planning

By JOHN IHLDER

Manager, Civic Development Department, U. S. Chamber of Commerce

THE automobile found us in our customary frame of mind, resentful of an innovation which interfered with established habits. From the day when the drivers of horses cursed an occasional devil wagon to the present, when crowds of pedestrians, many of them car owners themselves, denounce the delays and hazards at busy crossings, our attitude has been negative. Probably if we had realized back in 1900 just how drastic are the changes which the automobile is forcing upon us we would have organized a crusade against it. For our lack of imagination, instead of being the handicap we usually consider it, is probably one of the chief factors in our progress; it gives us the courage or the indifference of ignorance.

But we have now reached a point where we can no longer progress backwards, seeking means of keeping things as nearly as possible as they were in the days of our fathers. Suppression has become the dream of a fanatic. We find it difficult to remember even back to the time when it was not good form to go to church in an automobile—the very thought suggests all manner of irrelevancies—and when our feelings were outraged by the sight of an automobile at a funeral. And now regulation is proving a broken reed. So we have got to turn about and face a future in which adequate provision will be made for automobiles. This involves a revision of our practice in city building.

DREAMS IN CITY BUILDING AND RESULTS

For centuries our cities have been closely built. An occasional Utopian

dreamed of green and spacious cities, an even more occasional one sought to create them. William Penn had a vision of city dwellings set among green gardens and orchards. Yet before the Liberty Bell rang out its message his city had become red with its solid rows of brick houses. Washington and L'Enfant had the vision when they planned the Federal City and sought to safeguard it by making wide, tree-lined avenues. Today, behind the building lines of private property the Federal City is almost as overcrowded with buildings as is Philadelphia, and proposals to cut down street trees and widen roadways are constantly being advanced.

This tendency to over-build has its root in the human desires for a minimum of effort, for conveniences, for companionship. When Benjamin Franklin first walked into Philadelphia, every step counted. Even in his later days when he could drive, distance was a matter to take into serious account. But the dream persisted. The mass of men had caught the vision of the Utopians and desired more spacious cities. Because of that dream they welcomed rapid transit—horse cars, elevated railroads, trolleys, subways—believing that each of these would make the dream come true. On the strength of the dream they made a radical change in their manner of life. More and more those who could afford it deserted the dwelling above the store or beside the printing office and set up their homes at a distance made accessible by the new means of transit. So our cities spread out.

But each of these means of transit

had its counter effect. As it made the suburbs more accessible from the center of town, so it made the center of town more accessible from suburbs and what had once been distant communities. Consequently more and more people came in to the center to do their shopping, to attend the theaters, to consult their lawyers. And to serve these buyers, patrons, clients, more people were employed in the center of town, people whose hours of work or scale of pay made it inconvenient for them to live at a distance from their places of employment. So we had, as on the lower East Side of New York, constantly more numerous, more rapid, more expensive and more crowded means of transit provided in order that the workers of Manhattan might live in the green fields of the Bronx and Flatbush—fields and green when the means of transit were first provided, but quite different now—while at the same time the population of the thronging East Side increased steadily and rapidly. The dream did not come true.

Then city planning in its modern phase began. It had run true to form in its development. It looked backward for its inspiration. It saw Old World civic centers that put our haphazard locating of public buildings to shame. It saw broad boulevards which added to the dignity of cities. So we started out to beautify. We again began to dream and in some places this dream is coming true. Cleveland is about to realize its dream after some two decades of effort and fighting. Denver has realized its dream. So has Des Moines. In other cities there is progress and promise.

With achievement our dream became more magnificent. From civic centers and a few great boulevards we advanced to visions of park systems with connecting parkways. We drew plans which included not only the whole city,

but much of the surrounding country. And again some of our dreams are coming true. Chicago, in the generation since the World's Fair, has educated its electorate to support the magnificent city plan that is now gradually taking form. Cleveland and other progressive cities are expanding their vision and giving it form.

INCREASING CONGESTION AND EFFORTS TO AVERT

But so far we followed traditional lines. Except where parks or water or steep hills interfered, our cities grew solidly, the more open suburban developments swallowed by advancing rows of buildings. And behind these rows came skyscrapers, most numerous in the center of town but sporadically shooting up in other sections.

It was the skyscrapers that finally aroused us and forced us to realize that ancient and medieval and even modern Old World examples, though supplemented by rapid transit, do not give us all we need, that we must do some thinking for ourselves. Old time habits of concentrating nearly all the business life of the community were producing conditions that mean constant loss. High buildings crowded closely together darken each other's windows, cut off each other's air, turn streets into sunless canyons inadequate to carry the traffic demanded by the abutting population. Rapid transit instead of solving the problem has intensified it. Now comes the automobile.

The first obvious effects of the automobile's arrival are in our streets. These streets are crowded to a degree of which their dedicators could not conceive. Their death and casualty lists exceed those of battle fields. But—much more important from the point of view of securing action—their inadequacy hampers us in our daily life. We are continually annoyed and handi-

capped by the steady procession of cars that holds us chafing on the curb, or we are prevented from leaving our car where we wish to alight because someone else has already parked there. Our first and natural impulse is to widen the streets. Every day in every city there is discussion of the pros and cons of street widening, either by setting back the abutting buildings, or, as a less expensive compromise, narrowing the sidewalks and so securing more space for roadway.

Evidently such remedies as these, taken up piece-meal, are mere temporary palliatives. Any practicable increase of street or road width is immediately filled with more automobiles and the *status quo ante* is restored. So we have reluctantly begun to realize that we must be more thoroughgoing in our search for a remedy, must even examine anew some of our most firmly established practices in city building. This brings us face to face with what seems to be the fact, that the automobile differs from our former methods of rapid transit in that it demands a good deal of space for itself. Instead of enabling us to crowd more people into a given area, it is forcing us to diminish the density of population. The alternatives seem to be, either fewer people per square foot or fewer automobiles. Assuming what again appears to be the fact, that we shall elect to have *more* automobiles, the problem is squarely before us.

Following our natural bent as an ingenious people who delight in complicated and expensive contrivances for getting things that nature is ready to give us for nothing—such as light and air which we first build out and then force in—supplemented by our tendency to the spectacular, some of our cities are proposing to double-deck their streets or to dig automobile subways. Of course the recent experience

of Pittsburgh with its suffocating tunnel is not to be taken as a warning against such projects if they are really necessary. This merely demonstrated that there are technical problems still to be solved, problems relating to the automobile as well as to the tunnel; for the automobile should not give off deadly gasses whether it is in a tunnel or on the open street. The real argument against these proposals is that when they have been carried to triumphant completion, we shall be in the same situation that we are now, with an added tax burden.

A dim realization of the futility of such proposals is making us begin to ask some questions. For example, what is the most efficient width of roadway in terms of number of traffic lanes? Most of us, accustomed to rather narrow streets packed to capacity, now believe that widening will give relief and that "adequate" widening will give "adequate" relief. But some who have lived beside very wide streets with very wide roadways know from experience that they are not only very expensive, increasingly hazardous to pedestrians—for whom isles of safety must be made, so narrowing the effective roadway by a series of bottle-necks—increasingly difficult to police for traffic regulation; but that they are also comparatively inefficient for traffic flow because they tempt drivers to pursue a devious and traffic checking course. If it were not for considerations such as these we might, despite its cost, widen our streets until by the consequent diminution of building sites we had achieved that which we must finally achieve, though it is to be hoped by less costly means, a proper ratio between the carrying capacity of the street and the traffic needs of the people who occupy abutting buildings.

But this method of winning through attrition is too costly. Before the war

could be fought to a conclusion on this basis it is probable that many battle-grounds near the centers of our cities would be deserted by a large part of their population who would move to other and better planned areas. Essentially similar to the proposal for widening streets and thereby diminishing abutting building sites, is the proposal to cut new streets through built-up areas. The principal effect is the same, more street area, less building area. But again this is so expensive that there seems little likelihood of its being carried through on an adequate scale. Its advantage is that instead of making roadways inefficiently wide, it can make them of the proper width.

So we incline to turn to zoning as offering the most promising way out of our dilemma. If a given bulk of building of a given character—industrial plant, retail store, theater, apartment house, one-family dwelling—originates a given amount of traffic of given character—heavy trucks, delivery cars, street cars and busses, taxis, private passenger cars, pedestrians—on the abutting street, we have a basis for computing the ratio which should be established between building bulk and street width or roadway width. If a given roadway width is most efficient for traffic flow we have another factor which can be taken into account. Then we can decide whether to widen the street, to open a new street or to regulate the character and the bulk of abutting buildings. The last seems likely to prove the least expensive and the most effective.

But this, of course, takes account only of the first obvious effect of the automobile's arrival. The picture we have had before our mind's eye so far has been a busy business district with nearly continuous lines of moving cars. Except for those of us who live or work in the centers of a very few of the larg-

est cities this picture is supplemented by one of even more continuous rows of parked automobiles. In the very few exceptional cities the parked car has almost disappeared downtown where the streets wear a comparatively deserted look to the visitor from a bustling town up state or out west. The revulsion against much too much has thrown them all out, with what effect upon the business of the downtown area is only just beginning to be indicated by stories of firms which have moved to sites where automobile customers can still get at them. This moving of business firms because of traffic congestion is one we must study with some care. Because certain chain stores were located on corners where traffic counts showed the greatest number of pedestrians passing, many of us jumped to the conclusion that these were the most valuable locations for business, or at any rate for retail business. Now because certain stores are moving from the center of town many of us are getting ready to jump to the conclusion that all businesses depend on an automobile trade. This jumping habit saves mental effort, but it does not lead to good city planning.

THE PARKED CAR

The parked car, however, again raises the question of space and of a ratio. First, shall parking space be provided by the city, (a) on its streets, (b) on other public property, and, if so, shall it be provided free or for a fee? Present practice is to provide it free and on the street until the situation becomes intolerable, then to seek other public spaces and perhaps to charge a fee. But except where streets are very wide or where considerable unbuilt-upon areas remain within easy reach of the city center, these expedients promise no adequate relief. New space in-

vites more cars. So we return to the ratio. A given bulk of building of a given character draws to it cars the number and character of which can be fairly definitely determined. Shall the city provide parking space for these cars or shall the building itself make such provision? Shall we widen the street and so diminish the building site, or shall we provide on the building site storage space adequate to meet the needs of its occupants? Indications are that the latter will prove our ultimate policy and that in those sections of the city where populous and expensive buildings cannot be remodeled, either near-by accommodations will be found for the cars of tenants or those sections will find themselves in a losing competition with sections more fortunately situated. In either case density of population will be diminished for the car will displace a human, and the capacity of streets to carry traffic, of private land to shelter both cars and their owners, will tend to set a limit upon land occupancy.

So in new areas, more slowly in old areas as existing buildings are displaced by modern structures, we shall tend to establish an equilibrium between building and street so far as regular occupants of the building are concerned. But additional to the regular occupants are many casuals who visit the building or the district only occasionally. Experience should show how many of these may be expected in an area of a given character. Accuracy of estimate increases with the size of the unit. We can forecast fairly definitely the death rate of a city, but we cannot foretell the death rate among six specified individuals. The casuals visiting a certain office building or retail store may vary considerably from year to year with changes of tenancy, but the casuals visiting a number of office buildings or patronizing a number of stores are more

likely to remain nearly constant. It will be a business asset to the district if parking space is provided for them, and such provision may be considered a proper public function, because it affects the general well-being instead of redounding to the continued profit of easily ascertained individuals. Whether this public parking space should be on the street—provided it does not interfere with traffic flow—or on less expensive locations is a question that each community must answer for itself. Were it not that accessible locations off the street are likely to be built up unless secured immediately, the question might be left until moving traffic pushes the parked car off the street. Because of that likelihood the city planner must indicate public parking spaces now.

WHAT IS HAPPENING TO OUR STREETS

While the downtown or business areas we have been discussing constitute the most urgent part of the problem, it is not the only one that has engaged our attention. Almost equally interesting is the arterial highway by which the working population of the city centers speeds to its homes, or along which moves the traffic between separate business districts. These arterial highways are already in existence. Some of them were created for their arterial purpose in accordance with old time city plans, some are merely streets differing from others only in that they afford a more nearly direct through route than do neighboring streets. For them a new definition of an old word has been evolved. They are styled boulevards and traffic on them has right-of-way over traffic on cross streets. Had the city planners and city builders of a decade or more ago clearly foreseen the time when their arteries would be dedicated to automobiles at express speed they might

have saved us some expense by avoiding grade crossings. For the elimination of grade crossings, not yet complete along the railway lines, will before long appear as an item of importance in street and highway building.

Another change made by the automobile in once accepted city plans is that a considerable proportion of these through routes or arteries avoid the city center, diverting traffic away from, not toward the business streets. Unless they are successful in this the calculations of those who are figuring ratios between bulk and character of building and street width will be complicated by the necessity of making provision for through traffic which has no purpose in invading the downtown area. We still get an occasional traffic report which rejoices in a showing that prohibition of downtown parking has permitted through traffic to move more smoothly. The parked car had a purpose where it was, the through car came that way to everyone's annoyance merely because no equally good alternative route had been provided.

Away from the center or the centers, branching off from the arteries, are the neighborhood roads, leading to the homes of the community. Here again we face the questions of space and of ratio. One of our newest dreams in city building, made more practicable by the distance-shortening automobile, is that our communities shall no longer be expanding solid masses of brick and stone and paving material. In order to make our vision clearer we have begun to talk planning, not in terms of a city but in terms of a metropolitan area. In that area we picture a considerable number of communities, each more or less self-sufficient, grouped about a metropolitan center which was the old time city. These communities are separated from the center and from each other by broad

belts of open land, not parks merely but farms, orchards, truck gardens, woods. With well-paved arterial highways, or perhaps even narrow strips of built-up land crossing them, as old London Bridge with its flanking rows of shops crossed the River Thames, these open spaces mean to the automobilist only five minutes more in the open air. But that is still largely of the future; for while industries and commerce are now establishing the satellite communities we have not yet found a means of preventing them and the parent city from constantly extending their edges over the open area between until they merge as have those of Philadelphia with Kensington, Nicetown, Tacony. So, home neighborhoods for the majority of large-city dwellers still mean rows of houses or apartment buildings connected with their work places by other rows of buildings. In such neighborhoods the ratio must be applied. Especially in apartment house districts has it become necessary to decide for or against street widening and to seek storage space similar to that provided downtown.

CLASSIFYING TRAFFIC

To the dweller in these crowded home neighborhoods has become increasingly important the question of segregation or classification of traffic. It is bad enough to have the curb before his house constantly occupied by the cars of strangers, but it is even worse to have his peace disturbed, his house shaken, by heavy lumbering trucks and to have his special assessments increased by bills for repaving the streets those trucks have broken up. Zoning classifies buildings by use, creates districts of distinctive character. City or community planning is called upon to supplement this by providing thoroughfares of like distinction. To build all streets strong

enough to carry heavy trucks is extravagance. To pave and repave streets ruined by uses for which they were not designed is folly. To classify traffic and provide for the needs of each class is an economy upon which we are about to enter.

And this again will make for spaciousness in our cities. The cost of a house lot is not so much in the land as in the improvements. A light roadway, the medium priced roadway for which the engineers are now seeking, reduces the cost of the lot. Zoning, which not only determines for a long period the character of a neighborhood but sets a fairly definite limit to its population by determining the height and percentage of lot occupancy of its buildings, makes possible other economies. The size of sewers and water mains as well as the type of paving may be decided upon with some assurance. So space will not mean as it has, an undue burden of cost necessitated by an unpropheable future.

The speed and flexibility of the automobile—for its owner is not bound to

given routes or to a time schedule—makes possible not only greater spaciousness but better planning of new home neighborhoods. The great arterial highways which lead from center to center, the rapid transit lines gradually converted from local to through express routes with lower peaks and higher valleys in their daily schedules, will become boundaries far within which will be placed the schools and recreation places. Children will no longer cross lines of heavy traffic as part of their routine.

The human desires for a minimum of effort, for conveniences, for companionship, are as strong and compelling today as they were in Franklin's day, but the automobile apparently has put them within our reach without our crowding. It is doing more, it is compelling us to cease crowding if we would take full advantage of what it offers. Apparently its arrival will introduce a new era in community planning, or to speak more accurately since we have long *planned* spacious communities, a new era in community building.

Traffic-Transportation Planning and Metropolitan Development

The Need of an Adequate Program

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IT seems especially appropriate that, in so intensive a study of motor development, THE ANNALS should record some of the basic, outstanding facts and trends of this development and their effect on both present and future city life. The following analysis purposely sketches in broad perspective some of the major problems and practical steps to their "solution," though no permanent solution can ever

actually be attained in an era of such unexampled advancement—only progress toward greater perfection.

The greatest present need seems to be a properly balanced and scientific city program, with courage and vision to carry it out in practicable stages. At the outset of this discussion, in order that its scope may be fully apparent, the following suggests such a "platform" or plan of procedure:

WHAT AN ADEQUATE TRAFFIC-TRANSPORTATION PROGRAM SHOULD COVER

1. Plan a city double the present size, without stopping to quarrel when. It will come all too soon.
2. Comprehensive traffic and transport survey to establish the basic facts and conditions as to all traffic movement, growth, facilities, future needs and financing resources.
3. Schedule a definite development program in logical stages:
For the present—minimum cost and quickest results.
For the near future—at moderate cost.
For ultimate development—as can be foreseen.
4. Plan and budget a five-year reconditioning program for streets to develop, as quickly as possible, essential arteries and bypass streets to the roadway width needed for anticipated traffic.
5. Efficient traffic organization and control system, based upon the facts of the survey, including commercial vehicles, trucking, routing and delivery, and a scientific signal control system.
6. System of transit routing and operation best suited to traffic and civic needs, insuring maximum relief from street obstructions and delays, increased speed of service, and adaptation of motor-bus operation as justified.
7. Interurban passenger and freight system with city entrances, terminals and distributing facilities adequate to the needs of the community, whether by rail, or motor or both.
8. Railroad (and port) terminal system best suited to special classes of traffic and service, and most economical of valuable areas, streets and air-rights of the congested districts and of cross-town trucking in passenger streets—including belt-lines, motorized terminals, clearing, store-door delivery, rail-water interchange, and passenger commuter traffic.
9. Best relation of these elements to the whole city plan and general public welfare, in due proportion to local need.
10. Financial plan including probabilities of funds and revenues, fair distribution of cost and allocation of benefits.
11. Entrust this transportation plan to technical leadership or to an experienced commission, with working funds adequate to the responsibility of the task.
12. Organize a competent, civilian body for the constructive criticism and powerful support which such a body can give in upholding the public authorities in an adequate program of public works, and in insuring the intelligent consideration of all business interests, as well as the general public, to which the plan must be "sold," by various educational means.

City building appears to be a "social complex" of engineering, finance, politics, traditions and social habits. In ancient times, autocratic methods produced some remarkable results, but the restraints of Democracy today deserve equally serious inspection. City budgets, like national ones, are growing rapidly; in the case of New York, as the cube (third power) of the population.¹ The basic land value, measuring the city's purchasing power for public works, is increasing only as the 1.5 to 2.0 power of the population. How shall we ever catch up except by boosting the tax rate? Obviously,

¹ In 1922, 261 cities spent one and one-half billions, not including utilities; for highways about 9 per cent of this.

benefited population, or property, or private capital must absorb the shortage.

per acre, or 8,860 per square mile. (See Table II). Compare this with Chicago's *maximum* of 160,000 and

TABLE I—POPULATION AND MOTOR REGISTRATION

U. S. A.	1890	1900	1910	1920	NOTES
Urban population (million)	22.3	30.4	42.2	54.3	Cities over 2,500
Rural population	40.6	45.6	49.8	51.4	Towns and farms
Total	62.9	76.0	92.0	105.7	
Per cent urban	35.4%	40.0	45.8	51.4	Majority in cities
Per cent rural	64.6%	60.0	54.2	48.6	
Cities million class (million)	3.7	6.4	8.5	10.1	Recession
One-half million class	0.8	1.6	3.0	6.2	Advancing rapidly
Ratio	22:1	4:1	2.8:1	16:1	
Number cities	4	6	8	12	
					ESTIMATED
					1923 1930 1940
Motor Regis. (million) . . . . .	....	....	0.5	9.0	15.1 24.6* 30.0
Families (million)	12.8	16.2	20.4	24.4	25.6 28.0 31.0
Per family . . . . .	....	....	43.5	2.4	1.7 1.0*
Persons per family,	4.9	4.7	4.5	4.3	

* Estimate based on probable usage per family, 1940 equal to present California usage (already exceeds one motor per family).

THE DRIFT TO THE CITIES

Since 1900, about 24 million people have added to our city population. There will be about 25 million more by 1940—75 million total. The majority of our people now live in the cities and towns, and the curve is rising, while that of rural population is flattening out perceptibly. (See Table I). This drift to the cities is most significant; also the fact that cities of the million class showed last decade a distinct recession in growth rate, while the near-great cities of the half million class are growing with great rapidity. The smaller groups have not yet caught the fever of greatness. Prepare!

Population density is an important index. In 32 metropolitan centers (over 200,000) it increased 25 per cent in the last decade to an average of 13.9

New York's Ghetto with 640,000 per square mile, as against an *average* of 14,000 and 18,800 per square mile respectively. Thus the maximum average ratio of New York is just three times that of Chicago. It is these high spots that zoning and transportation must correct.

Suburban population is growing faster than in the city proper in these 32 large cities; but it is just the reverse in the 30 cities of the 100,000 class. This is clearly the effect of congestion, for the city areas of the 32 larger cities are one-fourth of the total metropolitan areas; in the smaller, one twentieth. (Table II). Here is involved a total of 26,000 square miles for future development, about the same as in the states of Maine, West Virginia or South

Carolina and 27 times Rhode Island. This is a measure of our future problem of transportation planning.

THE FUTURE OF MOTOR REGISTRATION

Motor registration should be considered at this point. My analysis

TABLE II—METROPOLITAN DISTRICT GROWTH AND DENSITY

	1910		1920		INCREASE 1910-1920			
	* (a)	† (b)	(a)	(b)	Pop.		Per Cent	
Population.....	over	100,000-	over	100,000-	(a)	(b)	(a)	(b)
(millions)	200,000	200,000	200,000	200,000				
Central city.....	17.7	3.2	22.1	4.1	4.4	0.9	25	31
Outside city.....	5.4	2.1	7.1	2.6	1.7	0.5	33	19
Total.....	23.1	5.3	29.2	6.7	6.1	1.4	27	26
Area (1920)	Areas (millions)		Square Miles					
Central city.....	1.5	0.47	2,370	730				
Outside city.....	5.3	9.6	8,270	15,000				
Total.....	6.8	10.1	10,640	15,730				
Density (1920)	Pop. per acre		Pop. per sq. mi.					
Central city.....	13.85	8.75	8,860	5,630				
Outside city.....	1.35	0.27	861	173				
Total.....	4.3	0.66	2,750	426				

NOTE. Largest increase in suburbs. Reverse in the case of the smaller city groups.

* (a) Covers 32 cities of over 200,000 population. "Outside" suburban zone includes areas about 10 miles beyond city limits with density over 150 per square mile.

† (b) 30 cities, 100,000 to 200,000 population.

The family unit is another index. Families in this country doubled in number from 1900 to 1920. They now exceed 24 million, but the number in an average family dropped from 5.0 to 4.3 from 1880 to 1920. While this average number in a family is lower in the cities than in the country, the average number of persons per dwelling is higher in the city—5.7 to 4.6. By 1940, there will be in excess of six million more families in cities to provide for, or a total of 31 million. (See Estimate, Table I).

(Figure I, page 207) shows a strikingly constant rate of absorption at the 20th power of the population (1905-1920), thence a decided recession, undoubtedly due to the approach to city "saturation." Had this rate continued, there would be 100,000,000 motors by 1930—an absurdity. There are now as many motors as telephones; in California, as many as there are families.

If the California density be reached over the United States, then clearly 30 million motors are in sight around

1940.² About 73 per cent of all passenger automobiles in the United States are in cities and towns of over 1,000 people—9.5 million or more—

² Families per motor, U. S. A. 44 in 1910, 1.7 in 1923.

averaging only 1.6 families per motor as against 1.93 in 1922.³ This registration has increased 27 per cent since 1922.

³ Based on the classification of *The Motor List*, 1922-23. (Nat. Auto. Chamb. Commerce.)

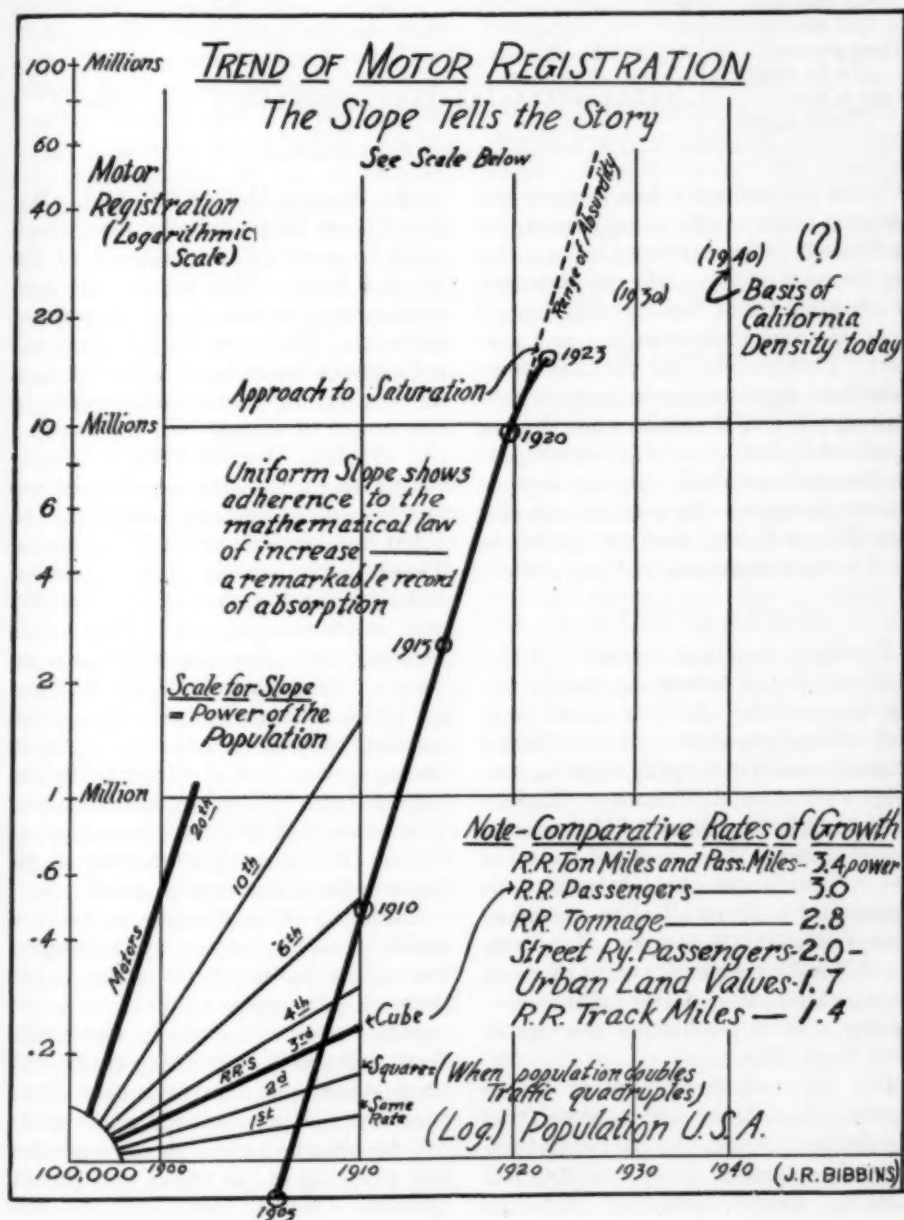


FIGURE I—WHY OUR TRAFFIC STREETS ARE "CONGESTED"

Low Traffic Efficiency Tells the Story

	RELATIVE SPACING INDICATES CAPACITY POSSIBILITIES										VEHICLES PER TRAF- FIC LANE PER HOUR
Average rush use..... (All outlets)	A				A					A	300
"Good practice"..... (Traffic street)	A	A	A	A	A	A	A	A	A	A	1,000
It can be done..... (Traffic street)	AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA										3,000

Thus the motorist has become the national index of city development, for he himself is the taxpayer in supporting his own utility. The development of adequate traffic facilities will depend upon his own understanding and support. Fortunately, the obvious recession from approaching saturation conditions will give the cities some time to think and plan, to relieve transit proportionately and still keep the factory wheels going, for the present capacity (see Figure I) will soon be needed to meet replacements and new population.

EFFECT ON ZONING

Zoning is designed to curb "immigration" at the source, *i.e.* to discourage congestion. Already about one-half of the population of the United States is zoned in varying degrees, one-third by "complete" zoning. Of cities over 50,000, two-thirds of the population is zoned—54 cities out of a total of 144. Two hundred and twenty-one towns and cities of all sizes are zoned—over 25,000,000 people. But there are still a dozen notable cases of delay in cities above the quarter million class, having a total population the size of New York City.

But the curb to congestion lies in sky-line downtown and in density of population outside. In the central district the usual limit is 150–200 feet building height, although Chicago

broke through this to 265 feet. But few "Loop Districts" are now developed to one-half or one-third of the allowed limit. This means that congestion can double or treble without restraint. Obviously rapid transit will only hasten the debacle. The lid must be clamped on tighter and closer in to the center of things. In the residential districts, density control usually ranges from 500–600 square feet per family in apartment districts, to 7,500 feet in the private home areas. These limits permit gross densities, including street areas, of over 100,000 and 9,000 people per square mile respectively. The latter happens to be the *average density* of the 32 largest cities today. In fact, population can increase from two to eight times in these various zoned districts before "spilling over" into the adjacent zones, which alone will effect real decentralization. Of course this tendency is always present, but largely latent.

Zoning is of inestimable value as a stabilizer and corrective, and resting on the police power of the state, must proceed with caution. But, until the controls can be materially tightened, there will result little aid to traffic and transportation in reasonable time. Fortunately, quicker methods and results can be obtained through organization and planning of the traffic and transit system. Central traffic can be dis-

persed, sub-centers definitely established where desirable, and decentralization forced, through such media as routing, short lines, fares, expresses, stops, etc. However, in the long run, transportation and zoning are clearly dependent on each other.

Economic limitations are in some degree automatically corrective. Land values force outwards low-profit businesses. Higher cost of living does the same, especially when prices of labor and commodities are out of balance. Higher cost and time of transit encourage factories to move out nearer the home districts, where employes can walk to work. (Twenty-five per cent of them walk in certain large establishments in Chicago.) But here again, zoning interposes very definite restraints and justly so.

COST BURDEN OF TRANSPORTATION

The cost burden of transportation is a large one. It amounts to no less than \$2,000 capital for the average family and an annual operating cost of \$600. By 1940, another \$1,000 capital will be needed and an equal amount will be necessary for replacements. The complete transportation plant of the country—rail, water, road, trolley—has cost in excess of \$50,000,000,000 and \$15,000,000,000 per year to operate.⁴ About two-fifths of this is due to motor transport. Transit alone cost the cities from \$50 to \$75 per family in the pre-war period, and probably \$75 to \$100 today. An analysis of delivery and freight costs, to the people of Washington in 1917, showed a total of about \$200 per family. Motoring costs the city dwellers from \$300 to \$400 per family, judging by the number in the cities. Longer and longer haul is the rule in freight, passenger, transit and motor. There is much duplication and

lowered efficiency from congestion—all a burden on the taxpayer, the motorist and his family. The only way out is a more scientific plan of co-ordinated transportation.

London, the "bus paradise," offers a good lesson. Following the strike, unrestricted bus competition caused the London General Omnibus Company to add 1,000 busses, 25 per cent, to its equipment to meet a similar increase in private bus operations, all for the same traffic. Conditions now are so serious that government control is invoked, for both operating speeds and profits are vanishing. The streets cannot bear the burden. American cities should take warning.

FUTURE TRANSPORTATION NEEDS

Transportation needs of the future are fairly clear. My analyses (see Figure 1) show that transit traffic increases nearly as the square of the population increases; railroad tonnage nearly as the cube; railroad passengers faster; and passenger mileage and ton mileage around the fourth power of the population. Motor traffic in New York is said to grow somewhat less than the registration.⁵ In general, it may be said that, when population doubles, traffic as a whole increases eight times. That is, by 1940, facilities should be three to four times as great as those of today. At least we should plan ahead for doubling our present city operations. Anything less is suicidal. This means all forms of traffic and transportation—rail, road, water and, not to be forgotten, air.

Capacity of traffic throats and terminals is the key to the problem, for all traffic largely focuses there. Capacity is the product of size of unit and average frequency of movement, and speed comes only with relief from

⁴ See original estimates in author's address, New York Railroad Club, March, 1923.

⁵ *Plan of New York and Environs Report*, April, 1924. (Goodrich & Lewis)

obstructions and delays. The most important need of our cities is street, track and terminal expansion, and seldom has the problem been attacked as a whole. Chicago still has only two elevated tracks in the "loop" to serve thirteen feeders. New York's railroad service handles one-fifth of the entire rail-passenger traffic of the United States, or one-fourth of the balance. The suburban traffic is largely rapid transit, rather than standard steam service suited to monumental terminals. In consequence, city streets have to take it all.

Higher efficiency standards seem to be the only quick way out. In a recent survey, I found the "loop" street outlets being used to only 25 per cent of their possible capacity, and assuming solid parking at that. Capacity could be doubled, yet the city is "congested." New York is passing 2,800 motors *per traffic lane per hour*—ten times the average found above. Transit looping and complex terminal routing often consumes more time than the rest of the average rider's trip home. Yet a saving of only five minutes would increase the radius of the 30-minute time zone by one mile, 10 minutes by two miles—enough to serve perhaps double the population. The 30-minute zone practically always determines the residence areas of the majority of the people. The railroad demurrage bill (on the basis of 15 of the largest cities) indicates an economic loss of two and one-half millions per year, equivalent to taking out of service for a day every freight car of the United States and Canada.

But the railroads, by increasing the average car movement from 25 to 30 minutes per day, actually save half a million new cars, or perhaps one billion new capital to do the *same* work. Motorized terminals and off-track stations are now a possibility and store-

door delivery is a near prospect. Port layouts are often exceedingly indifferent to city traffic needs—an excessive burden on the commerce of the port. The interurban entrance problem is acute in many cities, greatly handicapping their possibilities as fast freight as well as interim rapid transit carriers. And intra-city trucking and commercial deliveries have received practically no effort for better routing and higher load-efficiency.

SOLVING THE PROBLEM OF TRAFFIC AND PARKING

The most dramatic problem is traffic and parking. Good railroad engineering is needed, with less unskilled experimentation and spasmodic legislation. Scientific organization of traffic and minor reconditioning could cut traffic congestion at once by one half—double the street capacity. Traffic signals are rarely used, best suited to special local needs, which vary at every point. The economic design of roadways has only begun to receive the study it deserves, likewise the parking problem in its larger economic aspects. A properly designed system, with reasonable enforcement, can easily *treble* present-day parking capacity. City transit would benefit enormously by the relief. While effective when enforced impartially, "no parking" is unscientific and unnecessarily severe in many locations. The present tendency is marked by feverish haste rather than sober study and planning. Detroit, now operating its city railways, has prohibited parking on 40 miles of its main business streets and radial arteries for four miles out. Yet it already has the example of the sudden development of a subcenter—Highland Park—with a combined local traffic greater than Fifth Avenue, New York City, and quite unprepared for its enormous burden.

TABLE III—THE MAGNITUDE OF THE PAVING PROBLEM

SUMMARY: 290 cities (over 100,000 population) by the Asphalt Association (*Municipal Index*).

Total yardage, gravel—better type	602 million yards
Types better than water bound macadam	470 million yards, 78 per cent
Equivalent mileage (at 30 feet width)	3,500 miles
Population of cities	36.4 million
Mileage paving per million	960 miles

FIRST 24 CITIES (OVER 250,000 POPULATION) WITH 500 MILES OR OVER

	Yards	Miles (30 ft. width)	Population (1920) million	Mileage per million
New York	46.2	2,630	5.62	468
Chicago	36.8	2,090	2.70	775
Philadelphia	24.1	1,370	1.82	754
Detroit	13.8	785	0.99	785
Cleveland	12.0	682	0.80	852
St. Louis	25.1	1,430	0.77	1,851
Boston	11.4	649	0.75	815
Baltimore	12.0	682	0.73	934
Pittsburgh	9.9	563	0.59	954
Los Angeles	11.4	648	0.58	1,118
Cincinnati	10.2	580	0.40	1,430
Kansas City (both)	11.7	655	0.43	1,545
Portland, O.	9.0	511	0.26	1,962
24 cities	293.6	16,600	20.79	800

12 cities under 500 miles.

Excluding New York, 920 miles.

Total U. S. population, Urban, 54.3 million.

Paving mileage, at 920 miles million, 50,000 miles.

NOTE. Total U. S. electric railway mileage, 47,000 miles.

Metropolitan thoroughfares are called upon to take all this new burden of motor, bus and truck, as well as transit. Most street plans and systems are quite unprepared to cope with the present or future. Rail freight as well as transit traffic is rapidly gravitating to the streets—the common right-of-way. Maintenance and renewals, to say nothing of expansion, will grow in economic magnitude, supported by public taxation, district assessment on property benefited, or by the user. All this carries home the huge problem of amortization. Shall it be on the pay-as-you-go plan, an excessively slow development process, or pay-as-you-use, which spreads the benefit? Property assessment is being advanced today for subways, suburban rail serv-

ice, and streets and highways. Possibly a combination of all three may best meet the future. There are great opportunities for development of streets, transit and railroads, in the form of giant causeways, that are being neglected because of our tendency towards piecemeal planning. Billions can be saved to the future cities by planning on broader and more fundamental lines. Already, there are reported to be 80,000 miles of city paved streets,⁶ costing somewhere between three and four billions, or from 40–50 millions per million city population. It is unthinkable to attempt doubling their capacity on the *present* unecomic methods of use. Arcading,

⁶ See Table II (compiled by Asphalt Association, the *Municipal Index*, 1924.)

elevated walkways and street-grade separations have yet to be worked out on some equitable plan of cost distribution. And bus transit will only accentuate the difficulty.

NEED FOR TRAFFIC-TRANSPORTATION PLAN

A traffic transportation plan for the future is a most imperative need. It cannot be postponed except by vast distortion of city growth. It demands co-ordinated effort of all transport and industrial agencies, in proportion as they contribute to, or are affected by, traffic (rail, trolley, road, water and air). It needs leadership. Cities will never be able to cope with the problem by abortive legislation or drifting. It must be attacked scientifically and in a large way. Niggardly support now will simply invite future disaster. Take the rise in land values alone, which is

rapidly destroying the possibilities of economical developments where most needed; witness the huge cost of cutting a new trunk thoroughfare down town.

But while transportation is indeed vital, it should be integrated in a highly sympathetic manner with all phases of the city plan, of which it is a distinct part. Our cities have grown around transportation. While traffic increases by *multiplication*, physical facilities have only grown by *addition*, if at all. The only logical end of this unbalanced race is the increased economic burden of living and doing business. It is strange that, with such colossal economic losses even now being experienced, cities should be so hesitant to undertake the microscopical expense of a thorough technical survey of their problems and planning for a future that is bound to come.

The New York City Motor Traffic Problem

By HAROLD M. LEWIS

Executive Engineer, Regional Plan of New York and Its Environs

THE recent, very rapid development in the production and use of the automobile has had very great effects on planning problems in American cities. All of the larger cities in this country have felt the need of taking some immediate steps to relieve the congestion which has resulted both in the business districts and on the main highway routes leading to them. In New York City the problem is particularly acute due to the topographical conditions. Manhattan Island, which is the seat of the business of the metropolitan community, is the center toward which a vast amount of daily traffic converges. The location of Central Park has tended to concentrate most of the business activities within

the area south of 59th Street, which has therefore become the crux of the problem.

Within this area, which contains about 8.35 square miles, it is estimated that the day population on a typical business day in 1924 is about 2,941,700 persons. This is intended to represent the number of people within the area within those two or three hours of the day during which most of the business is concentrated. About 982,000 of the total are either residents remaining in the area or transients. This daily influx of persons is also accompanied by a large amount of automobile traffic, the distribution of which is indicated in Figure 1, page 215, which represents the total of one-way traffic during

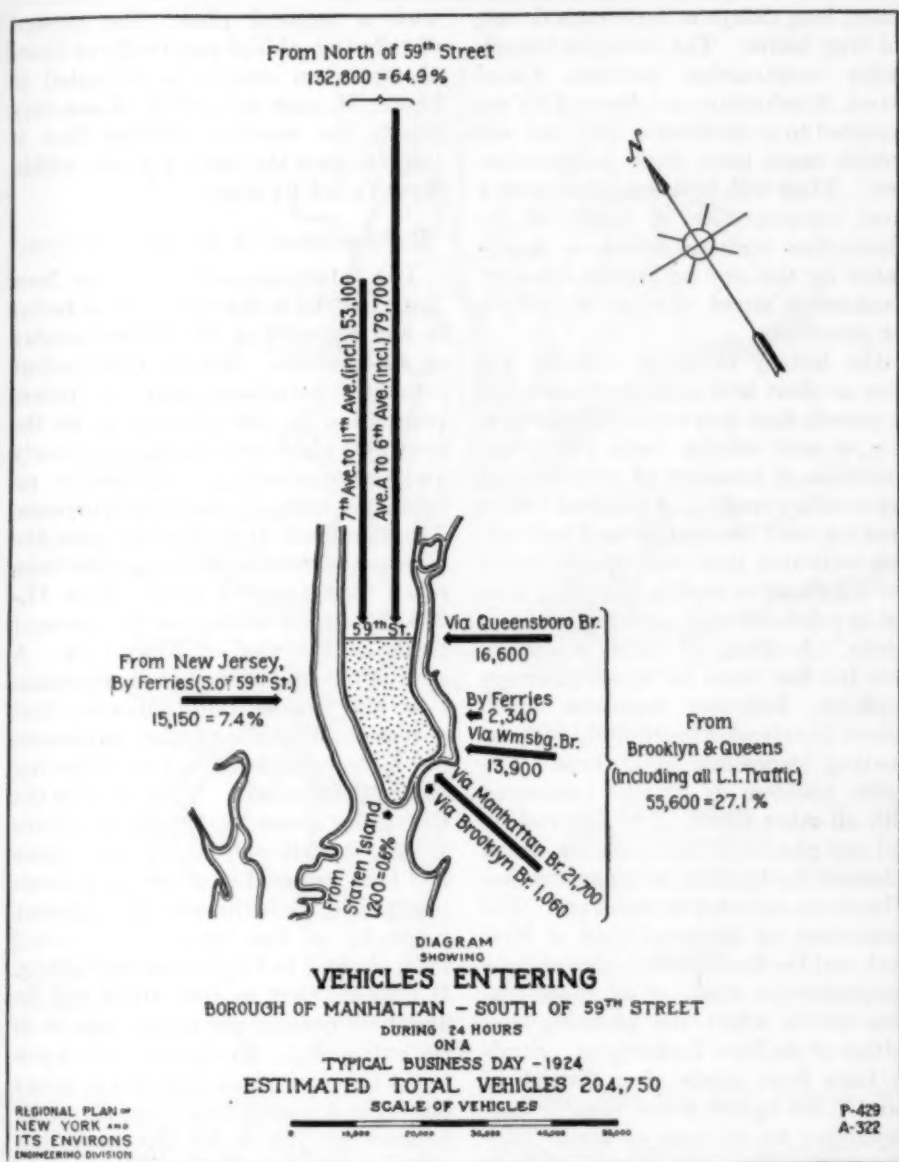


FIGURE I

twenty-four hours on a typical business day in the present year. Most of this traffic comes from the north and enters the district on fourteen north and south avenues. That which comes from Long Island on the east is almost en-

tirely carried by three of the four bridges indicated, and causes extreme congestion at the approaches of each of these bridges. Traffic from New Jersey on the west is still limited to the facilities furnished by ferries, which

causes long delays at both ends during the busy hours. The vehicular tunnels under construction between Canal Street, Manhattan, and Jersey City are expected to be finished in 1926 and will furnish much more direct communication. They will, however, also cause a great concentration of traffic at the Manhattan terminal which is appreciated by the city authorities who are considering street changes to relieve the situation.

The history of motor vehicles has been so short and so unprecedented in its growth that it is very difficult to arrive at any reliable basis for future estimates of numbers of vehicles and the resulting traffic. A study of curves showing both production and registration indicates that both these curves are still rising so rapidly that they cannot be extended with any degree of certainty. A study of traffic statistics, over the few years for which they are available, indicates increases which cannot be extended indefinitely without creating impossible conditions. The traffic problem is vitally connected with all other means of transportation and any phases of city planning which influence the location or concentration of business, industry or residence. The Committee on Regional Plan of New York and Its Environs is undertaking a comprehensive study of all those features which effect the planning and welfare of the New York region. Studies have been made of a district of about 5,500 square miles, roughly corresponding to an area of about fifty miles radius from the center of New York City. The solution of New York City's traffic problem hinges upon the successful solution of the problem for this entire area. This must not be considered from the highway point of view alone, but it must be carefully coordinated with all those other problems which are being studied in connection

with a regional plan. The present distribution of highway traffic at times of maximum density is indicated in Figure II, page 217, which shows very clearly the resulting burden that is thrown upon the main avenues within New York City itself.

REGISTRATION OF MOTOR VEHICLES

The future population of the New York District is the most potent factor in any estimate of the future number of automobiles. Several independent estimates have been made for future population in this district up to the year 1965 which correspond very closely and are undoubtedly sufficiently reliable for regional planning purposes. These indicate that by that year the total population in the entire area may reach 21,000,000, of which about 11,278,000 would be within the present limits of the city of New York. A study of the relations between population and registration indicates that curves showing the number of persons per motor vehicle have been following a quite definite law. There were in the entire city about 45 persons per motor vehicle in 1916 and in 1923 this figure had been reduced to about 16 persons per vehicle, while those for the different boroughs at the latter date varied from about 9 to 21 persons per vehicle. It appears that in 1935 there will be about six persons per motor vehicle in the entire city. Brooklyn would have about this same ratio and in the other boroughs it would vary from about $2\frac{1}{2}$ persons per vehicle for Queens to ten persons per vehicle for Manhattan. These figures give some indication of the great increase in the use of motor vehicles in New York City since 1916 and bring out the fact that this use will continue to increase to a considerable extent. It is believed that by the year 1950 the relation between population and registration will become quite



FIGURE II

stable and that from that date the number of vehicles will more closely follow the population. Similar studies have been made for the Environs of New York City and the total New York and Environs area. These show that the use of the automobile is considerably greater in the environs than in New York City itself. In the former there were 7.2 persons per motor vehicle in 1923, while the figure for

the whole area was 11.1 persons per vehicle.

With these figures as a basis and the estimated populations, the registration curves indicated in Figure III, page 218, have been obtained. These indicate that the 1923 registration in New York City of about 371,000 vehicles may reach a total of almost 1,200,000 by the year 1935. The total for the whole area during the same

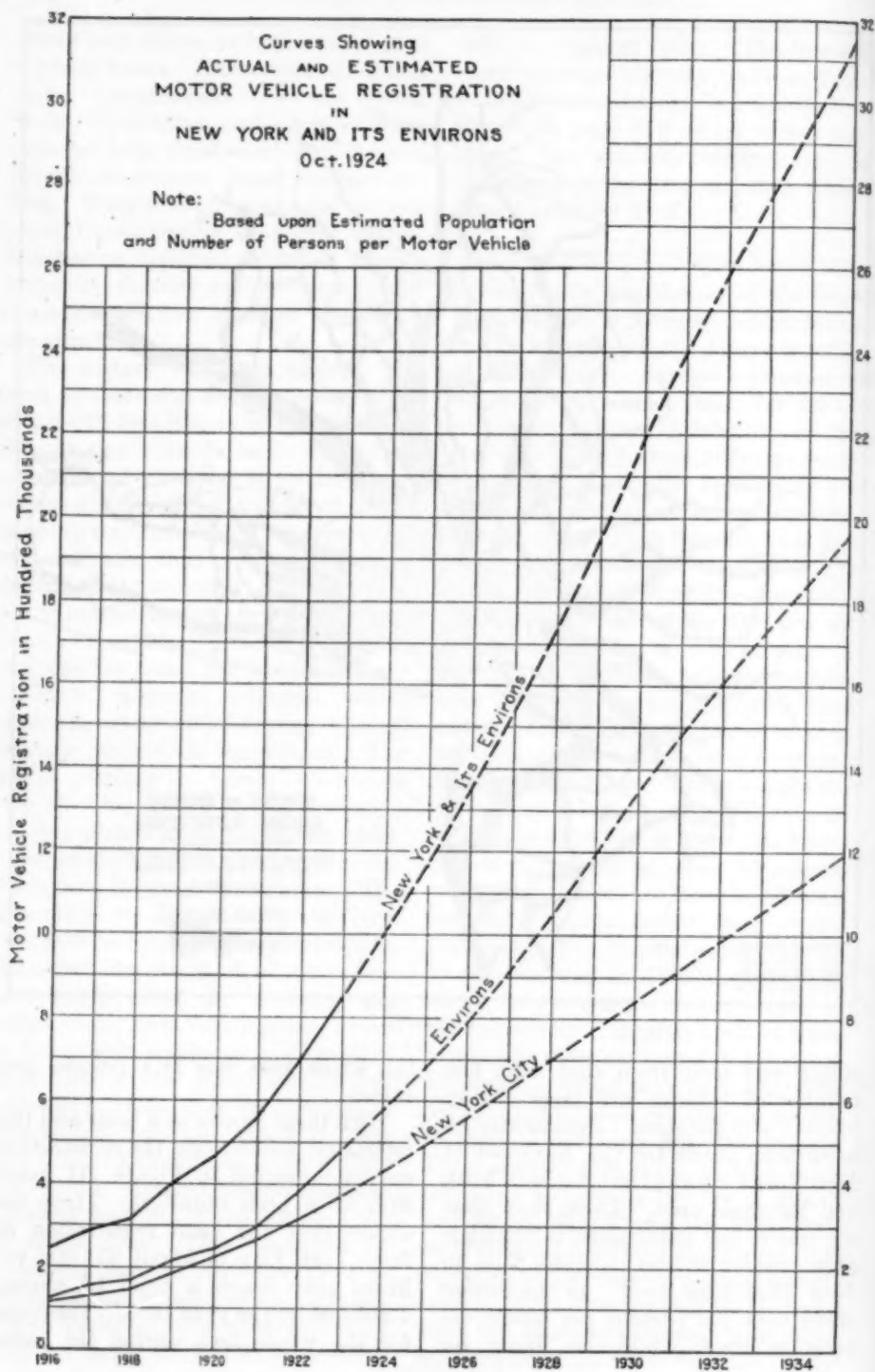


FIGURE III

period may increase from about 851,800 to 3,150,000.

FUTURE TRAFFIC

In order to translate the figures for increase of registration into a measure of traffic increase, it is necessary to establish some relations between registration and traffic. A study of available statistics for roads in the central part of the area indicated that this relation is different for different types of highways. Curves for different routes could all be expressed by equations of the form

$$T = kR^n$$

where T equals traffic, R equals registration, k is a constant, and n is determined from the slope of the respective curves on logarithmic paper. It appears that the value of n is higher for streets within the central part of the district and decreases as one goes further out from the center. The value of n appears to vary from about one third for roads in the outskirts of the region to almost unity for the main highways in the most congested district. This shows that the problem is most acute in the latter, as the traffic at such points has the highest rate of increase.

A careful study has been made of the existing capacity of the north and south avenues in the borough of Manhattan. Such capacities were computed on a lane basis, the capacity of one lane being varied with the conditions on various types of streets. It is assumed that the traffic counts made by the Police Department in the winter of 1922-1923, on 5th, 6th and 8th Avenues in the neighborhood of 42nd Street, were almost equivalent to the maximum traffic which such streets could accommodate. It is undoubtedly true that considerably more traffic might be forced through these streets,

but only under conditions which would so greatly increase the congestion and time consumed that they would represent very undesirable conditions. In fact it is believed that they would be such as to ultimately discourage business in these areas and start a backward movement in the development of the district. Certain definite proposals for the relief of these avenues have been frequently made and some of them are actually being carried out. These include the following:

Removal of trolley tracks from 2d, Lexington, 7th and 9th Avenues;

Replacing the 3rd and 6th Avenue Elevated Railroads by subways;

Construction of a viaduct on the east side of the Grand Central Terminal;

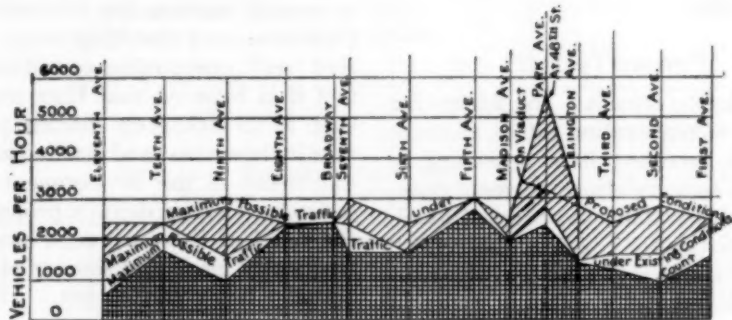
Widening of the roadways on Lexington, Park and Madison Avenues.

The last of these suggestions is now being carried out and the construction of a viaduct on the east side of the Grand Central Station has already been approved.

Figure IV, page 220, indicates 1923 traffic on all the avenues crossing 28th and 48th Streets, the maximum possible under existing conditions and the maximum which can be obtained by the carrying out of the proposals listed above. It is indicated that even then the capacity at 48th Street would only be about 167 per cent of 1923 traffic, while that at 28th Street would be about 234 per cent of 1923 traffic. This means that with the probable increase in traffic the point of saturation would be reached at 48th Street in about the year 1930 and at 28th Street in about the year 1934.

PRESENT REGULATIONS

The fundamental principle of traffic regulation is the desire to secure the maximum use of present facilities. As a physical measure, with the same end

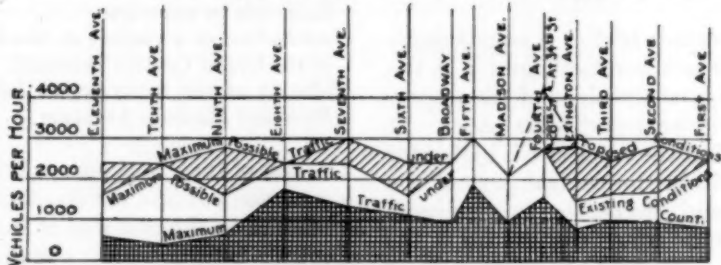


48TH ST.

Total Maximum Hourly Traffic on all North and South Avenues (Jan. 1923) - 23420 Vehicles per Hour

Total Maximum Possible Hourly Traffic under Existing Conditions - 23225 Veh per Hour - 125 % of 1923 Count

Total Maximum Possible Hourly Traffic under Proposed Conditions - 32200 Veh per Hour - 167 % of 1923 Count



28TH ST.

Total Maximum Hourly Traffic on all North and South Avenues (Jan. 1923) - 14900 Vehicles per Hour (Interpolated)

Total Maximum Possible Hourly Traffic under Existing Conditions - 23100 Veh per Hr - 195 % of 1923 Count

Total Maximum Possible Hourly Traffic under Proposed Conditions - 34500 Veh per Hr - 234 % of 1923 Count

EXISTING AND PROPOSED TRAFFIC CAPACITIES ON NORTH AND SOUTH AVENUES - MANHATTAN

FIGURE IV

in view, the pavements of many roadways have been widened so as to provide ampler space and a higher natural speed. In many instances the addition of only a few feet has made it possible to provide for a full additional traffic lane width, thus materially augmenting the capacity of the thoroughfare. A still further step might be some form of legislation which would reduce the volume of unnecessary traffic so as to afford better facilities for that which is essential to community needs. The exclusion of pleasure vehicles from cer-

tain motor truck thoroughfares is explicitly in this direction.

Great progress has been made during the last few years in the regulation of traffic in the congested areas and many people believe that this has been carried, if not to the physical limit, at least to the limit which is desirable. The block system installed on Fifth Avenue and Park Avenue has greatly increased the capacity of those streets and has probably resulted in drawing to them a large amount of through traffic which could be better cared for

on other streets. In order to spread this traffic more evenly over the island, not only would it be necessary to resurface many of the avenues to make them more attractive for automobile traffic, but additional regulation would be necessary to deflect traffic to them. The means for regulating traffic in the less congested parts of the area have not been so well developed and there is undoubtedly considerable opportunity for improvement. This improvement would consist not only in small physical changes to direct the lines of traffic at important intersections and the installation of automatic signals, but in some cases the actual rerouting of vehicles.

During the past year or two there has been great increase in the use of the block system of traffic control. This system is most efficient where there is considerable traffic, both on and across the avenue under control, so that the time of halt is utilized by a large number of vehicles on the cross streets. Such conditions exist on the island of Manhattan and on many other main avenues within the congested district and this system has therefore been very beneficial at such points. This system should not be applied without a careful study of the special conditions in the locality.

New York has carried out, more than any other city, the system of one-way streets. In the borough of Manhattan this was started on the east and west streets in the southern part of the island and has recently been applied to all such streets south of 59th Street. It has been suggested that it should also eventually be applied to some of the north and south avenues.

It should be pointed out, however, that these avenues are in many cases from 700 feet to 900 feet apart and that one-way regulations will necessitate long detours for many vehicles going between two points within this district.

It is quite possible that in some cases the resultant length of haul may so increase the total distance traveled that the increase in traffic and the resultant delays would more than counterbalance any gain in freedom of movement.

Parking restrictions have been greatly increased in the borough of Manhattan during the past summer and were recently extended to thirty streets in the extreme southerly part of Manhattan. There has been considerable difficulty in enforcing the regulations imposed, but the need for them is generally admitted and the need for suitable provision of parking space in this district has been greatly emphasized.

Closely allied to the problem of parking of passenger cars is that of the unloading of trucks at the curb. In certain parts of the city, particularly within the wholesale district, this has resulted in reducing the capacity of many of the streets to a single lane of moving traffic. There are several cases in both Manhattan and Brooklyn where the owners have voluntarily installed loading and unloading spaces within their building lines. The result is not only the removal of a large amount of standing traffic from the streets but a considerable increased efficiency in the handling of merchandise. It is quite probable that a campaign could persuade many of the owners that it is beneficial for them to provide such facilities. If relief cannot be obtained in this way some restrictive ordinances will become necessary.

FUTURE REQUIREMENTS

As already stated, it is indicated that the growth of traffic will be quite different in the different parts of the New York and Environs area. Studies on the basis of counties have indicated that during the period from 1922 to

1965 the amount of traffic on the principal highways will vary from about 3.2 times for the counties in the outskirts of the area to 9.5 times for those within the central congested district. In order to provide for such an amount of traffic several things are obviously necessary. First among these is provision for by-passing the central area and particularly the southern part of Manhattan Island. It is now necessary for practically all traffic from New Jersey or Long Island to the Bronx or New England to pass through the business streets in Manhattan Island. A diversion of this traffic through by-pass routes would not only represent a saving of time but would leave the Manhattan streets more available for the traffic which naturally belongs there.

Closely linked up with the subject of by-passes is that of improved crossings of the Hudson River. Due to topographic conditions and the desirability of dispersing traffic coming into the southern part of Manhattan Island, it is generally admitted that vehicular tunnels would form the most satisfactory method of vehicular communication south of 59th Street. A bridge has long been suggested for the neighborhood of 57th Street, but its great expense and its interference with navigation and the possible resultant confusion at its terminals raises grave questions as to its feasibility. Another bridge site which is being seriously considered would cross the Hudson from Fort Washington Park, Manhattan, to Fort Lee, New Jersey. It is certainly true that the highway traffic system of the whole region can function much more efficiently if the barrier of the Hudson River can be reduced by suitable highway connections.

Within Manhattan itself it appears as if any new traffic facilities would be crowded to capacity as soon as avail-

able. This raises the question as to whether increased facilities may not tend to so encourage the use of the automobile as to cause increased congestion. This can only be avoided if the limits of height and density of buildings can be so reduced that it will be possible for the present streets to take care of the traffic necessary for the maximum amount of buildings allowed upon the blocks. While the present zoning restrictions in New York City were the maximum that it was thought could be adopted in 1916 when the Zoning Ordinance was passed, it is now obvious to those studying the problem that these restrictions at present permit a far greater building density than either the street system or future rapid transit systems can ever accommodate.

There are certain types of business which are advantageously grouped in the same vicinity. Others are more or less independent and could readily be decentralized with advantage both to themselves and to the general system of transportation. The results of the economic and industrial survey of the Regional Plan of New York and Its Environs indicate that a decentralization has already taken place in certain types of industry. This should be encouraged and should be accompanied by the establishment of supporting residential areas near to industrial sites.

Several of the larger cities in the United States are considering the possibility of eventually excluding motor vehicles from areas intensively devoted to business. To a certain extent this can automatically be accomplished, if suitable garage facilities are provided on the edge of the business district so that passenger cars could be left at such places and the streets within the business district left available for commercial use.

Much can be done by the segregation of traffic, which can be carried out along

two lines: first, by the segregation of through and local traffic, and second, by the segregation of trucks and passenger vehicles. The latter has in the past generally been done by the restriction of certain parkways and boulevards to passenger vehicles only. It is probable that in addition to such restrictions there will eventually have to be highways which are intended for trucks only and which passenger vehicles would naturally avoid or from which they would actually be excluded.

SUGGESTED PHYSICAL CHANGES

It has already been indicated by Figure IV, page 220, that some additional street facilities will soon have to be provided in the central part of New York City. Several different suggestions have been made for accomplishing this. One of the most interesting was submitted to the Regional Plan Committee by a group of architects, under the chairmanship of Mr. Harvey W. Corbett. The ultimate development of this proposal would mean the creation of streets in three tiers, in which all of the trolley or rapid transit lines would be placed underground, the present street level would be given over to free-wheel vehicles, and pedestrians would be provided for at the present second-story level. Studies have been made for a system of elevated drive-ways around the waterfronts of Manhattan Island and connecting with the Manhattan Bridge to Brooklyn and the Canal Street Vehicular Tunnels to New Jersey. It is intended that such routes would be restricted to fast moving,

passenger traffic. It is believed that they would provide for a large amount of the through traffic which is now crowded into the central business avenues, as is clearly shown by the diagram in Figure IV, page 220.

In connection with a study for a suburban rapid transit system, Mr. D. L. Turner, Consulting Engineer of the Transit Commission, has proposed the creation of two new avenues between 2nd and 3rd, and 9th and 10th Avenues respectively. These would be two-story streets 120 feet in width, the upper level being reserved for express motor vehicle traffic and the local business being restricted to the present street level. Another suggestion has been made for raising the grade on certain of the avenues and building subways in open cut at only a sufficient depth to provide clearance for the cross streets. The buildings on the avenues would be rebuilt to conform with the upper street level which would connect, by occasional ramps, with the existing street system.

The seriousness of New York's problem is fully realized and it is believed that from the suggestions which have been made and will be made some satisfactory solution will be found. It is hoped that the detailed studies being made by the Committee on Regional Plan of New York and Its Environs may help to arrive at a solution which will be part of a comprehensive regional plan for the entire district and which may also offer valuable suggestions to other metropolitan communities who are trying to solve similar problems.

The Plan of Chicago in 1924

With Special Reference to Traffic Problems and How They Are Being Met

By E. S. TAYLOR

Manager, Chicago Plan Commission

IT has been exactly fifteen years since the city of Chicago was put in possession of a city plan (November, 1909). It is hardly necessary to review the history of the Plan of Chicago now, and yet a few words about it may serve to link the past with the present more understandably. The authors of the Plan of Chicago were Daniel Hudson Burnham, Edward H. Bennett, and a staff of masterly artists, architects and technicians. Mr. Burnham had been persuaded to undertake the task (which he loved, had lived with a long time before he took it up officially, and which he considered the best work of his career) by the Commercial Club of Chicago. This organization is composed of one hundred of the leading business and professional men of Chicago. These men had seen the swift industrial and commercial development of the city; they believed that the future had even greater things in store on condition that the great future city were intelligently anticipated and provided for. Then, too, many of the members of the Commercial Club had been directors of the World's Fair, and they longed to preserve the beauty and order which had flourished so brilliantly and inspiringly for the short period of the exposition.

So the Plan of Chicago was laid out under the auspices of the Commercial Club of Chicago, and when the technical work was finished and embodied in a report, the whole was presented to the city of Chicago as a gift, with the

recommendation that a commission be appointed with the duty of studying the plan and recommending its execution to the proper municipal—or other governmental—authorities. The Chicago Plan Commission was accordingly established by act of the city council, and the members—representative men to the number of 328—appointed by the mayor, who also named Charles H. Wacker permanent chairman.

THE PURPOSE OF THE PLAN

The purpose of the Plan of Chicago is two-fold. Regarded in one light it is a commercial proposition. The projects in the plan are so designed that our streets, arterial highways, railroads and waterways may be put to their highest and best uses; and if to their highest and best uses, then also to their most economical and profitable uses.

Regarded in another light the purpose of the plan is a social or humanitarian one. The plan aims to conserve the natural resources—woods and water—surrounding the city for the health and pleasure of the citizens; to reclaim neglected neighborhoods; to give the worker quick and easy access to and from his home and his work; to reduce the cost of doing business and therefore the cost of living; and, in a word, to make Chicago a highly desirable city for residence as well as an equally desirable environment for business. With the humanitarian aspect of the plan is bound up the esthetic also;

in fact it is impossible to isolate any one of the projects in the plan and say of it, "This is exclusively a humanitarian measure"; or, "This is strictly a commercial measure." No, the Municipal Pier (completed 1915), for example, is intended primarily for shipping and is part of the Lake Michigan harbor development, yet it also makes one of the most popular and useful pleasure spots in the city. So too with Michigan Avenue, which since its improvement (completed 1920) has unified the north and south sections of the city and has also provided the setting for many of the public buildings used by the people—libraries, public and private; the Art Institute; Grant Park with its fountains and monuments; the Field Museum; and the Municipal Stadium (opened September 14, 1924). Every one of the projects in the Chicago Plan, if analyzed in similar fashion, would show the same two-fold significance.

HOW THE PLAN RELIEVES CONGESTION

The mastery of the traffic situation in Chicago is bound up with the execution of the Chicago Plan. Every Saturday night there are one thousand, one hundred and fifty more automobiles upon the streets of Chicago than there were on the preceding Saturday night. This increase goes on week in and week out. By the close of the present year there will be between sixty-five thousand and sixty-nine thousand more machines upon the streets of Chicago than there were on December 31, 1923. This gives an idea of the serious problem confronting the Chicago Plan Commission in its efforts to expedite the movement of persons and vehicles to and fro from one section of the city to another.

So far as the traffic features of the Chicago Plan are concerned, the Plan provides for three avenues of effort.

The first of these is the creation of a quadrangle of wide streets around the central business district. Next is the provision of every possible channel of communication between the heart of Chicago and the north, the west, and the south sides of the city. Thirdly, there is the provision for a system of wide thoroughfares, such as are usually called "major streets," extending from one end of the city to the other. Construction work on all three of these undertakings is now going forward.

The Chicago Plan Commission was established in 1909. Its efforts ever since have been directed toward carrying out first those improvements which would yield the greatest benefit to the greatest number of people, and which—if they were to be made at all—would have to be made without delay.

Such a plan of action clearly pointed to the speedy improvement of street traffic conditions within the central business district, known around the world as the "loop." The name was derived from the fact that the elevated railroads loop around the intensively developed "downtown" or central business district, but the character of this district is the result of causes which lie deeper than the presence of the elevated structure alone.

Chicago, as any school child knows, is bounded on the east by the waters of Lake Michigan. Its development, therefore, ever since the days of Fort Dearborn, has had of necessity to be south, west and north. But as the frontier Indian trading post grew, developing first into a village and then into a city, it ran against obstacles in all three of these directions which forced its business growth up into the air rather than outwards. These obstacles were the Chicago River and the railroad rights of way, formidable enough to the north and west, but even more so to the south, where nearly one

square mile of territory is absorbed by railroad occupancy to the extent that only one single north-and-south street connects the central business district with the south and southwest sides of the city through this district.

Thus it was that in laying out the Plan of Chicago the technicians provided for the development of a quadrangle of wide streets surrounding the heart of Chicago, for the purpose of allowing through-bound traffic to go around the congested district rather than through it; and for the further purpose of permitting the central business district to grow and expand normally, so that it should occupy several times its present restricted area of only one-quarter of a square mile.

Within Chicago's loop today there are nineteen streets. Upon fifteen of them are double-track street car lines with cars at present turning in all four directions at nearly every intersection. A new plan of traffic regulation eliminating left-hand turns in the loop is expected to better conditions somewhat, but thorough-going and permanent improvement will come only as the result of the completion of the Chicago Plan quadrangle. The improvement of the four streets comprising this quadrangle will—it is expected—be entirely finished within the next two or three years, and once the quadrangle is in operation it will cut present loop street traffic nearly in half. Traffic counts show that upon the downtown streets of Chicago every week day there are about 175,000 vehicles, 10,000 street cars, and nearly a million pedestrians. The four streets selected to form the boundaries of the quadrangle in the Plan of Chicago were Roosevelt Road (formerly Twelfth Street) on the south, Canal Street on the west, South Water Street on the north, and Michigan Avenue on the east.

The first street widening undertaken by the Chicago Plan Commission was the improvement of Roosevelt Road for the mile that it forms the southern boundary of the quadrangle, and on west for another mile through the west side of the city to Ashland Avenue, west of which the street was already 150 feet wide for some distance. The street was widened from 66 feet to 108 feet, and a viaduct and bridge over railroad yards and river, together nearly a mile long and 118 feet wide, are now under construction. The street widening proper was finished on December 20, 1917. Progress on the bridge and viaduct has been interrupted, first by the war and later by other considerations, but work is now going forward rapidly and when it is done the city will be further unified by an extremely efficient connection between the west and south sides.

The next street widening project undertaken by the Plan Commission was the improvement of Michigan Avenue, the eastern boundary of the quadrangle. Formerly, all traffic using Michigan Avenue between the loop and the north side of the city had to make a sharp detour just at the edge of the Chicago River; cross that stream by means of an old, ramshackle, center pier bridge, known as the Rush Street bridge; and then turn back into Pine Street which merged farther north into Lake Shore Drive and Sheridan Road. This street was 66 feet wide both south of the river, where it was known as Michigan Avenue, and north of the river as well, where it was known as Pine Street. Today both streets have been made into one, and Michigan Avenue is 141 feet wide, with an upper level (between Lake and Ohio Streets) extending from building line to building line used entirely for boulevard or light traffic; and with a lower street beneath for heavy commercial vehicles.

When the Chicago Plan Commission first advocated this improvement there were 9,725 vehicles per day crossing the river by means of the Rush Street bridge. Today nearly 73,000 vehicles per day cross via the upper and lower levels of the two-level, bascule, Michigan Avenue bridge which has replaced the Rush Street structure. This is a number of vehicles sufficient to give an automobile ride simultaneously to every inhabitant of a lusty young city like Dayton, Ohio, for instance; or like Dallas, Texas.

The improvement of Michigan Avenue has been successful beyond almost all hopes. It was an object lesson that won many friends to the Chicago Plan. This is perhaps the place to say that every improvement in the Chicago Plan has its own intrinsic usefulness; yet, although each single project can stand alone on its own merits, as they dovetail together to form the whole plan, they represent the best possible physical development for the city.

The two-level Michigan Avenue improvement, separating traffic automatically by providing separate levels for different classes of vehicles, cost about \$16,000,000. It was completed in 1920 and has already paid for itself six times over. Not only has it increased traffic facilities more than 700 per cent and eliminated an annual charge of \$2,000,000 resulting from traffic regulations which were formerly necessary, but it has also increased surrounding property values more than \$100,000,000. The cost was borne half by the city as a whole and half by the property in the benefited specially assessed) district.

Chicago secures its revenue in part by taxing the real estate within its borders. Hence an increase of over one hundred million dollars in the value of property surrounding the Michigan Avenue means, if the increased value

of this property is taxed in the customary manner, an annual revenue to the city of \$4,000,000. The city was therefore speedily reimbursed for its outlay upon the Michigan Avenue improvement, and every year hereafter will have this increased income that it could have obtained in no better way. So far as the property owners who were specially assessed to pay their share of the cost of the widening are concerned, for every dollar which they paid they have received twelve dollars back in the increased value of their property.

The western boundary of the quadrangle, Canal Street, is now in process of being widened from 80 feet to 100 feet at the expense of the railroads embraced in the west side Union Station group. When these roads wanted to erect a new terminal in Chicago—a terminal which, by the way, is now nearing completion and has involved the expenditure of some \$75,000,000—one of the improvements to which they agreed, upon the recommendation of the Chicago Plan Commission, was that of widening Canal Street, upon which the new terminal faces, at their own expense. The necessary work has practically all been completed and portions of the widened Canal Street are now being used by the public.

Upon the northern boundary of the loop district, along South Water Street, there has been ever since the oldest Chicagoan can remember, a great produce market. So congested has this market been all day long that not only was a very important east-and-west public street entirely absorbed by private business, but also every north-and-south street, connecting the central business district with the north side of the city, was jammed to such an extent that all moving traffic was confined to the 20-foot-wide street car right of way in the middle of the streets. The widening and double-decking of

South Water Street began October 1, 1924. That is to say, the wrecking of buildings to make way for the new embankment began. This work was, of course, preceded by years of technical study, by a course of judicious publicity, and by a long case in court for the condemnation of the property and the acquisition of the land. The new embankment is to be a mile and a quarter in length, from the intersection with Michigan Avenue to the bend in the river at Market Street. It is to be a two-level street all the way, the upper surface for traffic of all classes, and the lower street for heavy commercial traffic which will have a course unobstructed by any cross traffic. On January 1, 1925, this new street will, by city ordinance, be named Wacker Drive, in honor of Chairman Charles H. Wacker of the Chicago Plan Commission, in recognition of his distinguished services to the city.

This improvement gives the city two new streets where before it had none at all; for although South Water Street existed nominally, in practice it was entirely given over to the produce market, and was a thoroughfare for market vehicles only. The market is now moving to a more appropriate location, and the future development of the upper level of Wacker Drive will be of the very highest type of office buildings, hotels, theaters, etc. On the upper water side of the 110-foot-wide street will be a promenade with a handsome balustrade and steps at intervals leading to the lower level, which is to be 135 feet wide, 25 feet of which is dock space. The lower street will be used entirely by heavy commercial vehicles. It is wide enough for six lanes of trucks, three each way, at the same time. The lower level of Wacker Drive will provide a direct route along the northern edge of the loop district, unobstructed by any

cross traffic, for commercial vehicles traveling between the boat and railroad terminals east of Michigan Avenue and the warehouse district on the west side of the city.

In addition to the very great benefit which the city will derive from the acquisition of two new streets through its most congested area (the central business district), the improvement of South Water Street means even more in the relief of congestion in this city. It is the last link in the quadrangle of wide streets intended to by-pass through-bound traffic around the loop.

Counts of the vehicles entering and leaving the loop have shown that every sixth vehicle today is bound to or from the South Water Street produce market. The removal of the market, therefore, brought about by the widening of the street, will take from loop thoroughfares 16 per cent of the traffic now upon them. This figure is in addition to the 25 per cent reduction in loop traffic that will come from enabling through-bound vehicles to go around the congested district instead of through it, as they must today. Together the two represent a reduction of 41 per cent in present street traffic—a reduction which will afford positive relief from the condition of near-strangulation from which Chicago is now suffering.

Besides the quadrangle development, the Chicago Plan Commission is advocating and has brought about the construction of a number of additional street connections between the loop, the north side, and the west side.

An insufficient number of through streets is the greatest handicap under which Chicago traffic labors outside of the loop. The Plan of Chicago fully recognized this and the Plan Commission has worked on the matter until today construction work is going forward on the widening of Ashland

Avenue and Western Avenue (north-and-south streets), and upon the extension of Ogden Avenue (diagonal southwest-northeast) and Grand Boulevard (north-and-south). In court are the recommended widenings of five streets just west of the loop, the improvement of which will mean a remarkable acceleration of commercial traffic, and which will also lead logically to the development of a warehouse district. These streets are Polk, Taylor, Clinton, Jefferson and Desplaines Streets. Indiana Avenue and Twenty-second Street, the one north-and-south and the other east-and-west, are also in court preliminary to construction work. Prepared for action by the City Council is La Salle Street (north-and-south), the development of which is going to be second only to that of Michigan Avenue in its effect upon relief of traffic congestion, high-class development of property, and the increase of property values.

Prepared for action by the Federal Government is the Plan Commission's recommendation to acquire the two-block site on Canal Street between the Union and Northwestern Stations for a much-needed new main post office. This site combines many striking advantages, one of the most important of which is that it would be accessible from the south, west, and north without entering the loop and meeting the street congestion there, while at the same time it would be easily accessible from any part of the loop.

Besides the Union Station development already referred to, a second equally extensive and important terminal project recommended in the Plan of Chicago is under way on the south side. This project embraces the rebuilding of the Illinois Central terminal (at an estimated cost of \$88,000,000) on Roosevelt Road to face Grant Park. These two terminals still do not cover the whole terminal situation in Chicago.

There are other groups of railroads which have prepared plans for loop terminals to replace and improve upon the facilities now in use. Intimately associated with the proper solution of this problem of a third terminal is the straightening of the south branch of the river from Polk to Eighteenth Streets, which the Chicago Plan Commission vigorously advocates, and for which the Federal Government gave its consent in 1923.

From the standpoint of the relief of traffic congestion the river straightening would be one of the most effective things that could happen, for it would then be possible to extend five loop streets south to connect with their southerly extensions through the city, and with Archer Avenue—a great diagonal artery extending southwest through and beyond Chicago. As it is now, these five streets—Market, Franklin, Wells, La Salle and Dearborn—come to a stub end and the traffic which they should bear is thrust on to the few and over-crowded through streets which we now have.

PRESERVING CHICAGO'S NATURAL ASSETS

The three most precious natural assets which Chicago possesses are Lake Michigan; the forest lands to the north, south and west of the city; and the Chicago River. The Chicago Plan Commission recommended the conservation and improvement of all three. We have already described the plan for the reclamation of the south bank of the river in the heart of the city. The Chicago Plan Commission has taken up the other two recommendations with equal energy. With respect to the lake shore the conditions, briefly summarized, were as follows:

In 1869 a park system was laid out for the city. This included two parks along the lake shore—Lincoln Park to

the north and Jackson Park to the south. In the early 90's Grant Park, on the lake opposite the center of the city, was added to the system. There still remained a stretch of five miles between Grant Park and Jackson Park where the lake shore was completely absorbed by railroad tracks, and to which the people had no access. As a health and pleasure giving retreat the lake in this section was a total loss. Now, in 1924, after the settlement of a long suit to which the City of Chicago, the Illinois Central Railroad Company, and the South Park Commissioners were parties, there is a tremendous amount of activity in this section. The lake shore is being developed into a park 1,138 acres in extent by filling in the shallow water. The new park lands are being laid out in accordance with designs submitted by the Chicago Plan Commission. They will contain all the features for pleasure that are to be found in the other Chicago parks, including a lagoon 600 feet wide; and two drives (referred to now as the Outer Drives), which will prove extremely helpful in by-passing boulevard traffic swiftly for long distances. North of Grant Park the Lincoln Park Commissioners have plans to make connections with the new Outer Drives and to extend Lincoln Park to the city limits on the north, and much construction is going on now. When all this work is completed Chicago will have an uninterrupted waterfront drive forty miles long through practically one continuous park. Even now one frequently hears "Gary to Milwaukee" given as the probable extent of the lake front drive as it is popularly regarded. The rehabilitation of the Illinois Central Railroad facilities, including electrification of its services, and the provision for bridges to cross the tracks into the new park at approximately every mile, were important parts of the negotia-

tions for the park development of the lake shore to the south.

In accordance with the recommendation of the Chicago Plan with respect to the forest lands, the Forest Preserve District of Cook County was organized in 1914. There were at that time about 35,000 acres available, and of these approximately 27,000 have already been acquired. These lovely tracts, which form a belt about the city, are being kept in a state of nature, and no words are expressive enough to say what they mean now to a great urban population, and what they will continue to mean as time goes on.

THE CITIZENS ARE FOR THE PLAN

From the very outset the Commission has understood the importance of carrying the plan to the people that they might be thoroughly informed about it. All the construction work on plan projects—completed, in progress, or about to begin—has been preceded by vigorous educational campaigns. The plan is so good, so logical, so economical, and so forward-looking that it needs but to be explained to have its advantages understood. The Commission has taken it, by means of illustrated lectures delivered on an average of once a week for years, to thousands of citizens. It is described in a textbook prepared in the office of the Commission and used in the eighth grade of the schools since 1912. Its projects, collectively or individually, have been described in pamphlets issued and distributed by the thousand from commission headquarters. The methods of the Commission,—non-political, non-sectarian, and non-sectional,—and the plan itself because of its obvious merit, have had the support of the press in a way that no other movement in Chicago has ever had. The newspapers of the city are a unit in upholding the plan, and of course

their agency in keeping the plan before the people is most powerful, influential and valuable.

The powers of the Chicago Plan Commission are advisory only. The execution, therefore, of plan projects rests with the public officials, certain of whom are always ex-officio members of the Plan Commission. The Commission enjoys today, and has always enjoyed, the hearty co-operation of the men in public office.

At the moment then that the Plan of Chicago attains to its fifteenth anniversary, we find Chicago citizens believing so warmly in their plan and reposing so much confidence in the Plan Commission, that construction work on plan projects is going on in every part of the city; that plans are

matured for public works and other improvements, the construction of which is just waiting upon the courts, etc.; and that the technical staff of the Plan Commission has before it for study nearly a hundred projects for the facilitation of traffic. In fact, the guide out of a distressing traffic turmoil in Chicago—and the only guide—is the Plan of Chicago.

Subways, sub-sidewalks, overhead sidewalks, alley sidewalks, escalators, arcades, and stricter traffic regulations have been suggested for the relief of traffic congestion in Chicago; but, when all has been said, the major projects of the Chicago Plan Commission are still fundamental. They must be settled first, after which the others can follow intelligently.

The Plan of Philadelphia

BY JOHN IRWIN BRIGHT
Architect, Philadelphia

IN any discussion of the City Plan of Philadelphia, there should first be a statement of the problem, setting forth as clearly as may be its various elements. It can be expressed in diagrammatic form with the headings arranged in what I believe to be the order of their relative importance:

1. Housing
2. Business
3. Traffic: Water
 - Rail: Long Distance Freight
 - Long Distance Passenger
 - Local Transit
 - Automobile:
 - Trucking
 - Passenger
 - Pedestrian

To live among pleasant surroundings is a fundamental human longing. We work to attain this end and the main

function of intra-urban transportation is to afford a physical link between the home and the place of employment.

We have here the frame work upon which the whole structure of city planning must be built.

It cannot be too strongly maintained that the question should be primarily one of sociology. The home must receive our first attention, for it is incontrovertible that a poorly housed people is symptomatic of a serious flaw in the structure of our civilization. What is a home? Is it a single house or a tenement? Are bathrooms and dining rooms necessities or luxuries? The form of the city is the expression of just such intimate details, and if we adopt a transportation system and a street plan which in their operation foster overcrowding, in which the in-

terests of business take precedence to those of humanity, let us do it consciously and with deliberate intent.

The vast majority of men are engaged in earning their daily bread in places more or less distant from their homes. Philadelphia lies to the west of the Delaware and on both banks of the Schuylkill. Most of the land is suitable for building and the vastness of the area, offering but few physical obstructions, has brought about a tendency to spread in all directions. But it lacks a natural, well-marked sense of direction and the vagueness of its reaching-out has not prevented an intense concentration in the original center of the city, where the large shops, office buildings and banks are located. This condition is characteristic of most cities standing on featureless plains. They have no place to go, or, what amounts to the same thing, they have too many places to go. As a consequence, there is a huddling together at one place only.

The planner cannot ignore these facts. Should he advocate transportation and highways which will reduce the distance between the factory and the home, evolving a policy founded on the proposition that living conditions must come first in the scheme of things, or should he allow these vital matters to be decided by the land speculator?

Statements in the Socratic form demand answers, and Philadelphia, lacking the authority of a City Plan Commission, is silent, waiting for what the morrow will bring forth. The appointment of such a body will certainly not bring about the millennium, its opinion will not always be the council of perfection, but in the words of a celebrated engineer, "I offer this theory. It may not be unassailable. I myself take it with a grain of salt. But at least it is something to work from and anything is better than chaos."

BUSINESS EXPANSION AND RESULTING CONGESTION

The second heading, *Business*, covers a vast range of activities. But to be specific, just where shall our factories be placed? Quite evidently they can only exist where they are adequately served by rail, trucks and shipping, and where they can be reached by their operatives without prohibitive loss of time. But are we sure that the railroads and the docks are anything but a horrible jumble? Why increase the unstability of a basically unsound structure? The City Plan Commission must at least express its opinion on these things even though its advice is not followed.

And then there is the ever-increasing pressure at the center of the city. Every morning hundreds of thousands of people rush to an area of less than a square mile and try to stand on the same spot. The office buildings stack them in twenty or thirty layers high where they remain all day and at a given signal they rush for home. Wouldn't ten layers be enough—wouldn't five layers be even better? Here is a question that demands an immediate answer, and to obtain it a Zoning Commission was appointed. Zoning can only be beneficial as an elaboration of a well-conceived city plan, and in this case, whilst its members were wisely chosen, it had the effect of sending a little boy to do a big man's job. He tried hard and failed. When he urged that the number of layers be limited to permit the fellow at the bottom of the pile to get a breath of fresh air, a prominent officer of the city government spoke as follows: "The men who wish to build these great buildings are here. They represent at least a billion dollars. What do you zoners represent?" In ring parlance that was one on the button, and the

Zoning Commission has not yet recovered from the blow. So things are allowed to drift and congestion increases day by day. Year by year, buildings increase in size and number. Streets designed for a few horse-drawn wagons are now forced to contain huge street cars and countless automobiles. Everyone cries out for relief and every suggestion is condemned as impracticable.

A word must now be devoted to the port and to the through railroad lines. Here again a worn-out system, innocent of any comprehensive thought in its plan, is made to serve in some fashion, the metropolitan area of which Camden is as much a part as is Philadelphia.

In the beginning, sailing ships of a few hundred tons burthen nosed into the river bank on the Philadelphia side. Gradually the docks extended up and down the river until now in a casual, unorganized sort of way, they stretch for fifteen miles and use both sides of the stream. While tonnage was increasing from thousands to millions, the city was presenting a wider and higher barrier between the river front and the back country, and it is the hinterland which gives expression to a world port—the city acting mainly as a clearing house and a point of transfer. It is becoming more and more difficult and costly to move freight through this vast center of population, and all the merchandise is eventually handled on a river street entirely inadequate for the purpose. The whole thing simmers down to one point. The shipper asks but one question,—“How much per hundred pounds does it cost to transfer at the dock ocean-carried freight?” The cost at Hamburg is one-third of the New York charges, Philadelphia shippers pay in direct charges two and one-half times as much as the German merchant and then a large, additional, indirect sum. The handicap is almost entirely due to the

absence of an orderly, scientifically conceived plan.

The trunk-line passenger and freight system is similar to the port in so far as it is an elaboration of a planless competitive system. It serves the port so poorly that ocean freight for the main part simply ignores its existence and travels on to New York. How can some order be evolved from this confusion?

As if these difficulties were not enough, the automobile has suddenly descended upon us. At one stroke the city has burst its bounds, and for all practical purposes Philadelphia can now be regarded as a circle having a diameter of sixty miles. High-speed suburban trains have contributed to the expansion, but the automobile is by far the most important factor. From all points of the compass, these intensely modern vehicles converge towards the City Hall, each car occupying at least 150 square feet of the roadway. Often there is but one occupant. Twenty years ago, this same citizen was content with four or five square feet. The streets are no wider than they formerly were, but there are many more people and they insist upon many times more elbow room. They need roads from their homes twenty miles away and therefore we are beginning to see that the city itself is only part of a region. The vision must extend beyond the horizon and, for purposes of planning, political subdivisions must be disregarded. The Philadelphia approach to the new bridge is the affair of Camden in a very real sense, for if there is not freedom of movement on the west side of the river, the most adequate plazas and avenues on the east side will fail of their purpose. In a pipe of water any obstruction stops the flow in its entire length. City planning is but a detail of regional planning. It is a subdivision divided again into a multitude of subheads which can only be treated intelligently

as parts of a general scheme. The automobile has widened our grasp of this subject. A man who drives his machine has a very practical interest in the entire extent of the road and everything pertaining thereto. Political boundaries mean nothing to him.

There are many other things to be considered in the city or regional plan; public buildings, schools, water supply among them. But no one part can stand alone. The railroads, the port, housing, the street system, must be regarded as forming a complicated machine in which each wheel and shaft and bearing performs a certain function. But in this machine, constantly repaired and modified, there is one important wheel which is causing abnormal friction and must be redesigned. The highways generally, both regional and local, are being subjected to an impossible strain. Each population center in the region must be interconnected by low-grade, broad and wellpaved highways. Philadelphia is fairly well provided with divergent roads, but lacks almost entirely circumferential boulevards. As a consequence automobiles and trucks cannot get from one radial road to another without being forced into the center of the city. This causes congestion and needless loss of time. Through travel between New York and Washington, between Allentown and Chester or Reading and Trenton would be greatly facilitated by such a road. Its elements exist at present, but are so tortuous and narrow that it is quite useless.

SUGGESTIONS TO ALLEVIATE TRAFFIC JAM

Circulation in the center of the city presents a problem of its own. The streets are narrow, it is true, but the main trouble lies in the constant stoppage of traffic at street intersections. Street widening either by setting back the buildings or arcading them is im-

possible in any adequate degree. The time is rapidly approaching when our nomenclature will have to be revised and what we now call a street will have to be regarded as a traffic conduit. A new terminology often stimulates our mental processes.

We recognize three distinct classifications of traffic: rail, pedestrian and the automobile.

Rails can be elevated or depressed and thereby separated from the other two divisions. But even if the surface cars are abandoned, they would probably be replaced by high auto-busses, leaving the situation much as it is at present. The planner must design a "traffic conduit," in which there is no serious friction either in the straight runs or at intersections. This can be accomplished by using the present roadway for street cars and pedestrians. As a rule the cars come to a full stop at every intersection, and pedestrians can safely cross from one side to another during the time required to load and unload passengers. Automobiles must occupy a higher level and the platform must be arranged to allow vehicles approaching each other at right angles, at the intersections to continue on their way without stoppage. This is an essential detail, for it is generally realized that the main cause of congestion is the constant immobilizing of traffic at points where highways cross each other. We will have a two-storied street. With the addition of a subway for the use of high-speed trains and a pedestrian walk above the automobile right of way, the traffic conduit will contain four tiers.

At first glance this seems a dreadful thing, but what else is to be done? A horizontal amplification of the corridor is ineffective. A closed valve stops the flow in a six-inch pipe as absolutely as it does in a one-inch pipe and the traffic policeman, blocking east and west movement to allow north and south

vehicles to proceed, reversing the process every few minutes throughout the day, turns, as it were, a valve. Under this system a one hundred-foot roadway is quite as congested as a thirty-foot roadway. If we really wish to reduce overcrowding, we must get rid of the obstructing valves. It may be some time before this can happen. The suggested design might be greatly improved, but it is nevertheless a fact to be confronted that a sufficient head of water will burst any pipe. We are pouring more into our streets than they can hold, and if they cannot bulge sideways they must be increased in size vertically.

In so far as the treatment of the central part of the city is concerned, the task seems hopeless; and it is. Conditions can be improved in a measure and in detail, but "solution" is a word to be used with great circumspection.

Planning will help, at least for a time. A two-, three- or four-tier roadway will relieve some of the immediate pressure, and that is all that may be said for it. Our accepted philosophy of business, of land tenure and of credit is based on congestion and any proposal to relieve it cuts straight across every vested interest. A wider or more effective avenue will be accepted under the one and only condition, that it will increase and not diminish the number of its users.

The city planner must be given the

money to work with. A plan is generally a valuable advance notice to the dealer in land. He is the one who reaps most of the profit. When the city finally decides to execute the work, it condemns property under a valuation much of which has been created by the proposed improvement. Assessments of benefits, taxation based on higher valuations help to a certain extent but do not go far enough. I am speaking more particularly of new projects similar to the Parkway. It is a financial system as unsound as ever conceived by the brain of man and under which city planning is enfeebled to a point of inanition. If there is a remedy it lies in the right of Excess Condemnation. Working under such a law, more land can be taken than required for the actual purpose in mind and at a later date the surplus may be sold. It will not entirely prevent land speculation and the city government will not be able to get all of the profit, but it is quite possible for it to use this instrument so effectively that it may be reimbursed for part, or even in some cases, all of the expense. The passage of the act is rendered doubly difficult because there will first be required an amendment to the Pennsylvania Constitution. But once written in the Statute Books it will advance the cause of City Planning more than any other one thing.

Philadelphia's Traffic Problems and Their Solution

By J. BORTON WEEKS

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PHILADELPHIA is one of America's greatest centers of automobile traffic. Added to the 190,000 automobiles owned by the residents of the city and its immediate suburbs, are the thousands of commercial and pleasure vehicles coming daily over its great tributary highways, such as the Lin-

coln Highway, from the West and New York, the Chester and Baltimore Pikes from the South, the Willow Grove Pike from the North, and the Delaware River ferries from the East, as well as numerous other arteries of lesser importance.

For the handling of this traffic the

city has 1,486 miles of streets within its area of 130 square miles.

I. PHYSICAL ASPECTS

The traffic problem of a large city has, broadly speaking, two major aspects—physical and regulatory. As the stream of traffic swells and reaches the choking point, in a given section, means must be evolved for the affording of more adequate floor space, properly arranged. William Penn's plan of running his streets at right angles to each other, forming innumerable squares, had and still has, certain advantages, but with the development of the city to its present enormous proportions, this plan has developed manifest disadvantages from a traffic standpoint. It is the natural and economic thing for a traveler to go from one point to another by the most direct route. Hence we find in some of the better planned of the large cities, such as Washington and Paris, a great system of diagonal boulevards. The value of such a boulevard is shown by Philadelphia's spacious Parkway, running from City Hall, in the heart of the city, to the east drive of the Schuylkill River. Lancaster Avenue and Ridge Avenue and the great Roosevelt Boulevard are other illustrations of the value of diagonal thoroughfares. In some sections of the city it is still possible to carry through a system of diagonal highways, but this treatment will become more expensive as time goes by and will eventually become prohibitive.

An abnormal volume of traffic is carried by a few of Philadelphia's main highways. Walnut Street is the major carrier of east and west traffic, excepting east of the Schuylkill River, where it is a one way street and is relieved of east bound traffic by Chestnut Street. Broad Street, because of its great

width and length, bears the major north and south burden, running as it does from League Island to the Roosevelt Boulevard and beyond. There should be constructed east of Broad Street at some point west of the approach to the Delaware River Bridge, a parallel street of equal width, free of street railway lines, so that it may be devoted exclusively to motor vehicle and other vehicular traffic. The effect of this would be to relieve Broad Street of the great volume of traffic coming from a large portion of North Philadelphia, for points east of Broad Street in the business district. This traffic now uses Broad Street because of the inadequacy of the width and paving of the streets between it and the Delaware River. Another parallel street, without street car lines, should be constructed west of Broad Street, between it and the Schuylkill River. Walnut Street should be relieved by the widening of some parallel street to the south, and that street should be relieved of its burden of street car tracks.

ELIMINATING SURFACE CAR LINES

There can be no adequate solution of Philadelphia's downtown traffic difficulties so long as practically every street is occupied by street car lines. There are no surface lines in downtown London or Paris. In fact, there is very little mileage of surface cars anywhere within the limits of those great cities. Paris traffic, owing to its great diagonal boulevards and freedom from street car lines, to a large extent handles itself. Subway systems in both London and Paris, supplemented by adequately run bus lines and taxicabs, convey the traveling public in a satisfactory manner.

Surface railway cars in the business district of a great city constitute a great economic waste. Every inch of usable space on the downtown streets is of

high value. What a single street car line can do to that space is indicated by the condition of Chestnut Street, where the single track line occupies the center of this narrow one-way thoroughfare. When a street car stops for the purpose of taking on or discharging passengers, the center of the street is occupied by the car, the right side by the boarding and alighting passengers, and the left side alone can be occupied by vehicles, whereas there is room for three lanes of travel going in the same direction. If the car tracks were removed and auto bus lines instituted, the bus would stop, as it does in London, flush to the curb, unloading and loading its passengers directly from the sidewalk and still leaving two open lanes of travel, with complete safety to the bus users. With existing conditions, the street car today, the instant it stops, completely blocks at least two of the three lanes of travel.

HANDLING HEAVY AND EVER-INCREASING TRAFFIC

The problem of dealing with heavily traveled points, such as intersections or junctions of two or more streets, has been handled satisfactorily by the establishment of traffic circles around which the traffic can revolve. The most conspicuous traffic circle in the city is that on which City Hall is located and which receives the traffic from Broad Street, Market Street and the Parkway. A traffic circle, however, is only possible where there is space for a large circle. A new method of dealing with traffic at congested intersections, where it is necessary to make numerous right and left hand turns, has recently been suggested by Superintendent Mills. This plan contemplates the construction of a roadway across the corners in such a manner as to permit an uninterrupted flow of all traffic to the right. This "cut off" of

each of the four corners, without removing the actual point of the corner, can be employed at numerous points where it is not possible, because of lack of space, to create a traffic circle. A specific point at which Superintendent Mills has recommended the early construction of such a system of "cut offs" is the intersection of sixty-third Street and Market Street, where both right and left hand turns are made with great frequency by traffic coming from all four directions.

In the summer of 1926, the Delaware River Bridge, connecting Philadelphia and Camden, will be completed. The Philadelphia end of this is at Franklin Square, fifth and Vine Streets. It is reasonably certain that this bridge will be the means of drawing many motorists to the New Jersey shore resorts and will greatly increase the volume of intercity travel between Philadelphia and Camden, and its suburbs. In addition to the normal growth of travel between these two cities, there will be this much further tax on the capacity of this structure. There is nothing strange about this. It is a common occurrence for a public utility, which is greatly wanted, to be inadequate for the need it is designed to meet by the time it is ready for public use. The construction of another bridge further up the river has already been urged, in some location that will take away all the heavy travel bound for New Jersey destinations, from North Philadelphia and much from West Philadelphia, without the necessity of passing through the downtown congested area.

Philadelphia's main highways, leading to outside points, may be likened to the ribs of an open fan, with the Delaware River as the base. Some consideration has been given to the creation of belt lines, which will cross these radial highways in such a manner that they can be used by travelers de-

siring to avoid the central sections of the city. There is one such highway now designated by the words "belt line" on the telegraph poles, but neither its width nor its state of repair has been sufficient to excite any real interest or use. Circumferential highways connecting the radial highways, particularly just outside the city limits, are much needed. Study of this problem is now being made by a volunteer committee representing various civic organizations, including the Keystone Automobile Club.

Most of the major questions on the physical side of the city's traffic problem must be dealt with by the authorities in charge of city planning. In the future, as in the past, they will no doubt receive many constructive suggestions from the Department of Public Safety, in whose hands the practical problem of the daily control of traffic is entrusted.

II. REGULATORY ASPECTS

The regulation of traffic is an ever acute and changing problem in every large city. The great objective of regulatory measures is the greatest speed with the maximum safety. In Pennsylvania the rules of the road are established by a motor vehicle law, uniform in its effect throughout the state. This law prevents municipalities from passing any local regulations excepting with relation to stopping and parking, the establishment of zones in which vehicles may park at night without lights, the use of one-way streets, the regulation of the kind and weight of traffic on certain streets, and the establishment of safety zones. The city is likewise empowered to make special regulations as to the routes to be covered by vehicles transporting passengers. Even these regulations, if enacted into ordinances, are not effective until the municipality has posted adequate

notices or signs in the localities affected. The effect of this law is to give to the motorist, coming from any part of the state, adequate warning of special and local regulations, and to restrict those regulations within as narrow as possible a compass. The regulation of vehicular traffic other than that of motor vehicles is, in theory, under the control, exclusively, of council. Needless to say, it is necessary, by reason of the great preponderance of motor vehicle travel, for these regulations to be subordinated and conformed to the motor vehicle law.

TRAFFIC SIGNAL LIGHTS

The synchronized traffic system, extending over 17 blocks on North Broad Street, has proven thoroughly successful. Recent experiments with a "master light" in the tower of City Hall, around which Broad Street traffic revolves, did not measure up to expectations, because it did not adequately signal traffic proceeding away from City Hall and did not give ample warning to the users of intersecting streets.

A splendid improvement has been made in the installation and operation of the synchronized control of traffic lights in this city, by using a Warner time clock in connection with each light, instead of controlling the system by an underground cable, as in the past. A short time ago the use of these clocks was looked upon as an experiment. Today the authorities express the greatest satisfaction with their use. The effect on costs, both of installing and operating the synchronized system, has been very radical. The cable control plan involved an installation cost of from \$10,000 to \$15,000 per mile. It is now possible to install the system by using the Warner time clocks at an expense of from \$2,000 to \$3,500 per mile, the use of the clocks eliminating the necessity of laying cables.

Philadelphia has adopted the system

of traffic signal lights recommended by the International Police Conference and International Association of Chiefs of Police—red for "Stop," green for "Go," and yellow for "Prepare for Change," if an intermediate signal is given; or to be more accurate, this system of color signals, first in effect in Philadelphia, has been generally approved. The advantage of green as the signal to "go" is that it can never be confused with general street lights or commercial lights, which are nearly always yellow.

Simplicity and clearness, together with visibility both in daytime and at night, should be the aim of all traffic signs and lights. Under the Pennsylvania law there can be no conviction for the disregard of a legal traffic ordinance, where signs giving notice of the requirement—such as one-way streets, no parking, etc.—have not clearly shown their intentment. A common form of sign which means nothing, and the disregard of which cannot be properly penalized, is found in many localities bearing the words "No Parking" or "No Parking Here." What does such a sign mean? Does it mean no parking in front of the building in front of which the sign is placed? Does it mean no parking in that block or on that particular side of that street, or within a reasonable distance of the sign, or, if the last mentioned, what is a reasonable distance? Of course it is not necessary that a sign contain wording at great length, but it is essential that what it says shall be sufficiently clear to give to the stranger, as well as to the resident, adequate notice of what is required of him. A sign that means anything means nothing, if viewed from an enforceable standpoint. Adequate traffic signs are a great aid to traffic officers and tend to eliminate hesitancy, confusion and unnecessary stopping on the part of vehicle drivers.

Vivid signs can be made to convey a

meaning even to the unintelligent, as is illustrated by the experience in New Orleans, where, by reason of the large number of illiterates, signs of different shapes, such as stars, squares and triangles, of different colors, have each a definite and well known local meaning. It has been suggested by Superintendent Mills, in Philadelphia, that all traffic signs appear in the shape of arrows.

VARIOUS METHODS OF AIDING TRAFFIC

Most cities having wide thoroughfares such as Broad Street, Philadelphia, do not get the full value of the entire street width for traffic purposes. This is due to the failure of slowly moving vehicles to keep to the extreme right as the law requires, allowing the faster moving overtaking vehicles to occupy the left lanes of travel in the same direction. The enforcement of the rule of the road to "keep to the right" will give to cities possessing these wide thoroughfares, with several lanes of traffic in each direction, the full value of their floor space.

Left-hand turns are dealt with in Philadelphia, at any intersection where a traffic officer is on duty—excepting at certain points in the very heart of the city where left-hand turns are entirely prohibited—by the so-called "traffic turn control system," under which the driver stops to the extreme right of the street, within the limits of white lines painted on the streets, and awaits the signal of the traffic officer before making his turn.

The designation of one-way streets has been necessary in the downtown districts because of the numerous narrow streets occupied by surface street car lines. The policy has been to establish these streets only where there was a real necessity for them. These streets are designated by ordinance of Council on the recommendation of the Department of Public Safety.

Parking is by no means the least of a city's traffic problems. Every step in the direction of eliminating parking in congested districts evokes opposition for the time being. If an ideal city were to be planned by engineers today, in all probability there would be definite squares set aside in business localities for exclusive use as parking areas. It is undoubtedly a fact that thriving business districts away from the hearts of cities have been created and made successful largely by the fact that persons, desirous of doing their shopping by automobile, have found it impossible to park in downtown congested districts. The business section on Fifty-second Street, Philadelphia, is an illustration. The virtue of these small shopping centers is that, even though there may be a no-parking rule effective in front of the stores, side streets are usually available for parking purposes. It would seem that parking should not be prohibited unless the presence of parked vehicles impedes the speedy movement of travel.

Philadelphia's recent campaign against both glaring and inadequate headlights on automobiles has, it is believed, had much to do with the safety of night driving and walking, and this campaign, conducted jointly by the Department of Public Safety, under the direction of General S. D. Butler, director, and the Keystone Automobile Club, extended even beyond the city limits. It followed the declaration of the State Highway Department that the light equipment and adjustment laws would be enforced by the State Motorcycle Patrol. Eight hundred focusing screens were furnished to as many garages, designated by the Keystone Automobile Club, so that every motorist would have the opportunity to ascertain whether his lights were equipped with legal lenses and reflectors, and was given the opportunity of

having his lights properly focused—the bulb put in proper focal adjustment to the reflector—and the lamps properly tilted and aimed. The change effected by the enforcement of the headlight law has exceeded all expectations. Illuminating engineers and motor vehicle administrators who have visited Philadelphia recently have pronounced the experiment so satisfactory as to warrant similar efforts of enforcement elsewhere.

PHILADELPHIA'S CONTRIBUTION

Philadelphia has contributed, through its thorough student and administrator of traffic, Superintendent of Police William B. Mills, many important ideas with respect to the handling of traffic of a great modern city. Among these may be mentioned the use of the traffic semaphore for the first time in any city, the first official abolition of left hand turns at extremely congested intersections, the creation of the first no-parking areas and the establishment of the first one-way street. The latter statement may be qualified by stating that, while one-way streets have been in use since the days of Pompeii, and have been in use on streets of Philadelphia for the past fifty years as to certain very old streets less than twelve feet in width, the designation of Chestnut Street as a one-way street, marked for the first time the policy of any great city of setting aside one of its main downtown thoroughfares for the exclusive use of traffic proceeding in one direction.

Students of traffic are agreed that the human element plays a vital part in the successful handling of traffic. This is an aspect of the problem that has been specially stressed in this city, where courtesy and tact on the part of a traffic officer are held at a premium. Their attitude has its necessary reaction upon the drivers of vehicles.

The Traffic Problems in Detroit and How They Are Met

By T. GLENN PHILLIPS

Consultant, City Plan Commission, Detroit, Michigan

EVERY city of any importance has its traffic problems, due largely to the number of motor vehicles within its boundaries. The city of Detroit, however, occupies a position quite different, perhaps, than that of any other metropolitan center. This is caused by the manner in which it was laid out under the original city plan.

The first definite plan for the development of Detroit, prepared in 1807 and known as the Governor and Judges' Plan, proposed a series of important thoroughfares all leading to a central axis or circle. On that plan are found these remarks: "The streets that run north and south, east and west are all 200 feet broad; the other principal streets are 120 feet broad; the cross intermediate streets are 60 feet broad. . . ." A very small portion of the plan has been carried out and consequently the streets, to a great extent, are of insufficient width to carry the present traffic loads. After a lapse of over one hundred fifteen years, we are reverting to the street width of 120 feet for important thoroughfares, and 204 feet for super-highways.

Detroit is unique in its present street layout. The city is bounded on the south by the Detroit River and part of Lake St. Clair. Adjacent to the river and within a half mile circle is the city's business district. This is a hub, from which through streets radiate to the east, northeast, north, northwest, west and southwest, there being six such thoroughfares. These six thoroughfares bear a large per-

centage of the daily vehicular traffic and dump it into the one-half mile circle, or if the destination of this traffic is not the downtown area, it passes through that section of the city, destined for some other point, thereby adding to the congestion. It is now planned that a portion of the traffic, passing through the business district, going from one side of the city to the other, will be diverted to a cross-town thoroughfare which is being provided just north of the central district.

RELIEVING TRAFFIC CONGESTION

The first move made towards the relief of the traffic situation was the limiting of parking on certain streets, time limits being established for parked cars. This relief proved only temporary, because the increase in number of motor vehicles was so rapid that the advantage gained was quickly lost. Parking was then eliminated on one side of certain streets, and in some cases, on both sides of narrow streets. This, too, was merely temporary relief. Carrying the no-parking principal a step farther, an ordinance was enacted prohibiting the parking of any vehicle on certain through traffic or "stop" streets during the late afternoon and evening hours. On all streets in the central business district and on the important streets radiating therefrom, for a distance of several miles, no parking is allowed between 4.30 P. M. and 6.15 P. M. This plan has been of considerable value and is a real step towards the relief of the traffic situation, as it allows the mass traffic to

move from and through the center of the city during the rush hours of the day.

The City Plan Commission, together with other interested departments, in connection with its thoroughfare plan for the Metropolitan District, has prepared a traffic map of the downtown district, which shows the location of car tracks, street and pavement widths and density of traffic, that is, the number of vehicles passing a given point during certain hours of the day. Routes have been so planned upon this map that traffic which does not wish to come into the central business district may by-pass it. This plan will be placed in the hands of traffic directors at factories, trucking companies, etc., in order that the drivers may familiarize themselves with the best routes of travel around the business center.

A sure, if only temporary, way of aiding the present traffic situation is to provide wider pavements. The Department of Public Works has widened many thoroughfares, setting back the curbs and taking from the sidewalks or grass plots sufficient space to provide for one or two additional lines of traffic. Pavement widenings were started on a rather small scale because of limited finances, but the relief from congestion on the widened pavements was so noticeable that citizens clamored for further widenings, with the result that a definite plan has been worked out by the City Plan Commission and other departments, which will be followed for several years.

On all streets that are widened and in some instances where pavement widening has not been undertaken, the Department of Public Works has been increasing the turning radius at corners, thereby enabling motor vehicles to turn corners with greater

ease. Most streets and intersections were designed for the horse-drawn vehicle age and not in such a manner as to allow vehicles with long wheel bases to turn with ease. Though the work may seem trifling, the increase of radii at corners has had a decided effect in expediting the movement of traffic.

Another step towards the relief of the traffic situation was the passage, about a year ago, of an ordinance requiring all vehicles to come to a complete stop when entering or crossing certain streets. There are twelve streets included in the ordinance and each carries thousands of motor vehicles and street cars daily. The city authorities found, after a few weeks, that traffic accidents were greatly reduced and the movement of vehicular traffic to and from the center of the city was expedited. The "stop" street ordinance is a measure that Detroit officials commend to every other city that has not yet adopted the plan.

Detroit has the same enforcement problem that other cities have in carrying out its traffic regulations. A sufficient number of traffic officers have been placed on duty to impress violators that the law must be observed.

A new plan has recently been inaugurated to handle traffic cases. The violation of the ordinance results in a card being placed upon the car. The driver is given 48 hours in which to report with the card at the Violation Bureau of the Police Department. If he fails to do so, a court summons is issued and he is taken before a judge for trial. In the cases of those who report to the Violation Bureau, the first fine for improper parking is \$1, the second \$3, and the charge thereafter is \$5 for each violation. The driver need not pay this fine if he feels that the ordinance has not been

violated, his option being to appear in Traffic Court for trial. As the court procedure is slow and takes the greater part of a day, ordinarily, most drivers very willingly deposit their "bond" with the Violation Bureau, which is forfeited by his non-appearance at a later date.

AVOIDING "SATURATION POINT"

Detroit covers an area of approximately 85 square miles. That it has a traffic problem is emphasized when one studies motor vehicle registration figures for the city. Records of the Secretary of State show that on September 1st, 1924, there was a total registration of 242,322 motor vehicles, exclusive of dealer, trailer and other miscellaneous licenses, this total being only for passenger cars and commercial vehicles. The passenger car registration was 221,312 and the motor truck 21,010. This is an average of more than 2,850 motor vehicles to the square mile.

It is not known just when the so-called "saturation point" will be reached in Detroit, but many students of the traffic problem believe it is not far distant because of the fact that available street space for the movement of traffic, especially on the through traffic streets, is rapidly being taken up. Naturally, when no more vehicles can be jammed into the streets, or when so many have been put on the thoroughfares that they interfere with one another's movement, the mythical "saturation point" will have been reached. Some motor vehicle enthusiasts say that this will never happen.

To illustrate how rapidly the registration is being increased and the available street space is being taken up, one need go back only sixty days to the records of the Secretary of State. The figures quoted above for September 1 are considerably higher than those reported for the first day of July, 1924. On that date, the total registration for Detroit was 228,694, of which 208,785 were passenger cars and 19,909 commercial vehicles. The increase in two months was therefore 13,628 or at the rate of more than 80,000 per year.

Detroit's traffic problem has not yet been solved. Although parking has been eliminated in the down-town section of the city, master towers placed on principal streets and at important intersections, automatic signals installed and pavements widened, the increase of traffic is so great that we still have congestion.

The foremost step toward the solution of the problem has been the preparation of a comprehensive thoroughfare plan for the city and its environs. Streets 120 feet in width have been planned, running north and south and east and west, at intervals of about a half mile. These will connect with super-highways 204 feet wide, radiating from the city. The City Plan Commission insists that all mile streets be made 106 feet in width and all half mile streets 86 feet in width. This may not be the solution of the present traffic problem, but at least it will be a step in advance, planning for the future.

Reduction of Street Traffic Congestion by Proper Street Design

How St. Louis Is Meeting Its Problem

BY HARLAND BARTHOLOMEW

Engineer, City Plan Commission, St. Louis, Mo.

POOR street design is the underlying cause of street traffic congestion. Traffic regulation and safety education, while important and necessary, can never constitute a solution of this universal problem. The automobile has given new significance to the city's street structure. The narrow, ill-arranged streets of most cities are not adapted to the needs of modern traffic.

St. Louis had approximately 16,000 motor vehicles registered in 1916. The 1923 registration exceeded 100,000 motor vehicles and this figure will be increased to 200,000 by 1928. Traffic counts show an annual increase of 25 per cent in vehicle movements upon the city's streets. Something more than traffic regulation is needed. Freedom of traffic circulation is a commercial necessity.

In 1916 St. Louis possessed 940 miles of streets. Three-fourths of this street mileage was of 60-foot width. The other fourth, of varying greater width, was so unsystematically distributed as to be more or less useless in any city-wide scheme of traffic circulation.

INTRODUCING A MAJOR STREET PLAN

As one element of a comprehensive city plan, there was devised in 1917 a major street plan of wide, direct and continuous thoroughfares, serving all parts of the city. Leading from the business district, radiating thoroughfares were projected north, south and west. Supplementing the radial streets were crosstown thoroughfares

of a north-south and east-west direction, spaced approximately one-half mile or less apart. Widths of 80 and 100 feet were proposed on most major streets. Where wide streets existed they were incorporated in the scheme if satisfactorily located. Widenings, extensions and openings were proposed where satisfactory streets did not exist.

The plan represented an estimated total expenditure of \$40,000,000 for property damage. Some projects were vastly more expensive than others because of the necessity of removal or demolition of buildings. In some cases no expense was involved, particularly at the outskirts of the city, where property owners voluntarily dedicated the necessary right of way. The plan has met with much public favor and is now in a fair way toward ultimate realization, as may be seen by the following table:

	Miles
Major streets of satisfactory width	150
Major streets widened or extended to date	8
Major streets to be widened or extended and in various stages of completion	58
Major streets to be widened or extended and for which no action yet taken	33
Total	249

The total of 249 miles of major streets represents about 25 per cent of the total street mileage of the city. Projects completed, paved and opened for traffic to date have materially reduced street traffic congestion. Projects yet to be completed will greatly

improve circulation facilities and will satisfy most future needs.

The scheme was first proposed as a practical ideal toward which the city might gradually adjust itself. Its high cost seemed to be a formidable obstacle. In 1917 it was considered as planning of the boldest sort, if not extravagant. Within seven years it has been accepted as the official city plan, property owners on street after street having petitioned for early completion of individual projects.

A city bond issue of \$11,150,000 was voted in 1923 to pay the city's share of the cost of the plan. It is now estimated the total cost will not exceed \$30,000,000, approximately two-thirds of which will be paid by direct assessment of benefits. Not the least interesting result of the work done to date has been the accompanying increase of property values on streets newly widened or opened, often exceeding considerably and immediately the assessments levied for benefit.

RESULTS

The gradual execution of this plan has numerous ramifying advantages. Upon the major streets are laid the heaviest traffic pavements. This facilitates circulation throughout the city, reduces congestion at strategic points and keeps traffic out of minor residence streets. Special types of street lighting have been designed and are being installed upon these major streets. Special traffic regulations, such as the boulevard stop, are enforced on major streets. All of which is tending to promote order, facilitate movement, improve values and promote public safety.

Few widenings were attempted in the central business district. Market Street, the southern boundary of the business district, is being widened to 100 feet throughout the business dis-

trict and for a distance of three miles beyond. Morgan Street and Franklin Avenue, two thoroughfares immediately north of the business district, are being widened for considerable distances to permit of expansion of the business district and improved approach thereto.

The basic idea of the whole plan is distribution rather than concentration of traffic. This idea is being realized and, fortunately, without disturbance to existing conditions or established values.

Another advantage of the plan, already realized, is the opportunity for re-routing of transit lines to permit of more direct and freer movements upon the widened streets. The local transit company has been quick to seize the opportunity thus offered for improved service, and in one instance traveling time by trolley to the southwestern part of the city has been reduced approximately 15 minutes. This means much in the daily life of a great city.

Execution of this large program has not been accomplished without many difficulties, not all of which have been satisfactorily met. In many respects the city's legal authority has been most satisfactory, better than the average, perhaps, but there have been numerous delays from various causes, some mistakes in distribution of benefit assessments and other difficulties of minor importance.

Generally speaking, the plan is even more popular now than ever, has justified its expense, and, most important of all, has offered a genuine solution of the traffic congestion problem. What was considered unusually bold design in 1917, measured by conditions of today, is no more than sufficient, and ten years hence will probably be regarded as modest, if not niggardly. Daniel Burnham's prophetic advice to "make no little plans" was never more aptly illustrated.

There is no perfect solution of the traffic congestion problem in growing cities, at least for the present, since no one can say where and when motor ownership and use will reach the saturation point. The experience of St. Louis, however, teaches us that the approach to its solution is in the design

of the city's entire street structure and not in mere traffic regulation.

Good street design not merely facilitates solution of the street traffic congestion problem; it promotes more uniform and substantial city growth, and finds its ultimate reflection in the general prosperity of the community.

The Traffic Commission of Los Angeles

Its Work on the Traffic Problem

By PAUL G. HOFFMAN

The Traffic Commission of The City and County of Los Angeles

THE climate of Los Angeles is a subject of much enthusiasm on the part of its citizens, although the insistence with which it is brought into discussions affords some levity to those who are not yet residents. In a consideration of the local traffic situation it cannot be ignored. Undoubtedly the salubrious climate has contributed greatly to the local problem.

When it is considered that here exists the largest percentage of automobile ownership in the world—one automobile for each two and nine tenths (2.9) persons, a total of 430,000 cars in Los Angeles city in 1923, and that a uniformly mild climate encourages the use of cars every day in the year—it is small wonder that there is an ever increasing demand for better street facilities. It is difficult to surmise what the total passenger movement by motor car may be in Los Angeles City alone. Counted in the same way as trip fares on street railroads it is probably in excess of 2,000,000 daily.

Added to this the usual elements which create street congestion exist in Los Angeles in an especially marked degree. Rapid growth of a city is one—the growth here has been phenom-

enal, the population almost doubling between 1920 and the present time. Here as elsewhere, the unscientific width and arrangement of streets, the improper use of existing space, the promiscuous mixing of various types of traffic all aggravate the problem.

Recognizing the value of co-ordinating action for relief, the individuals, groups, civic organizations, and others interested in and affected by traffic conditions met in 1922 and organized the Los Angeles Traffic Commission. It was, in the beginning, a body of volunteers and entirely unofficial in character. A technical and office staff has since been added, but its unofficial status has been retained. The Commission is controlled by its membership acting through a board of fifty directors, who in turn delegate certain of their responsibilities to an executive committee of nine. Every effort is made to keep both the directorate and executive committee so representative in character that a true cross section of opinion can be obtained. As an example: At the present time on the executive committee the merchants are represented by the executive secretary of the Retail Dry Goods Association, the

street railroads by the operating heads of the two lines, the taxicab interests by the owner of the largest cab service, the motor car interests by the general counsel of the Automobile Club and one distributor, and the general public by two members selected because of their standing and freedom from affiliation with any particular group. The Commission is financed by voluntary contributions.

RELIEF PROGRAM

In forwarding its program of relief, the Commission has functioned in five fields: Regulation, street maintenance, street development, public transportation and educational publicity. It was early recognized that many of the difficulties affecting traffic resulted from a paucity of information on which to base intelligent action. The measures of relief which had been proposed were generally founded on unsubstantiated opinions. It has been the policy of the Commission, before making any recommendation in any field, to obtain the services of the best experts in America and through their investigation to develop the facts and data necessary.

Regulation. A special regulations committee has supervised the work in the field of regulation. They early impressed upon the Commission the wisdom and economy of securing maximum use of existing street space through better regulation of traffic. The "Boulevard Stop" was advocated and now five of our principal thoroughfares are so designated. Restrictive center button markers on three way or dead-end streets have been replaced by three markers located on the property lines and a much freer flow of traffic at such intersections has resulted. An extensive experiment with various types of signals has resulted in a recommendation to the city favoring the center type of electric flash signal as being

simplest and least costly, both as to installation and maintenance. On recommendation of this committee the City Council enacted during the last Christmas season a temporary ordinance prohibiting parking from 7 to 10 A. M. As there was already a prohibition from 4 to 6.15 P. M., facility of movement was provided during the peak traffic hours. Results were so generally regarded as beneficial that the council is now considering the passage of a regular ordinance with similar restrictions.

In July of 1924, Dr. Miller McClintock of Harvard University was employed by the Traffic Commission on recommendation of its regulations committee to draft an entirely new traffic code to replace the collection of ordinances now in effect. One portion of his work, that in reference to protection of school children, has already been enacted into an ordinance replacing the thoroughly ineffective and annoying school stop ordinance which had previously governed. The balance of the proposed traffic code will be presented to the council within a short period of time.

NEW SCHOOL CROSSING ORDINANCE NOW IN EFFECT

Obey these simple laws:

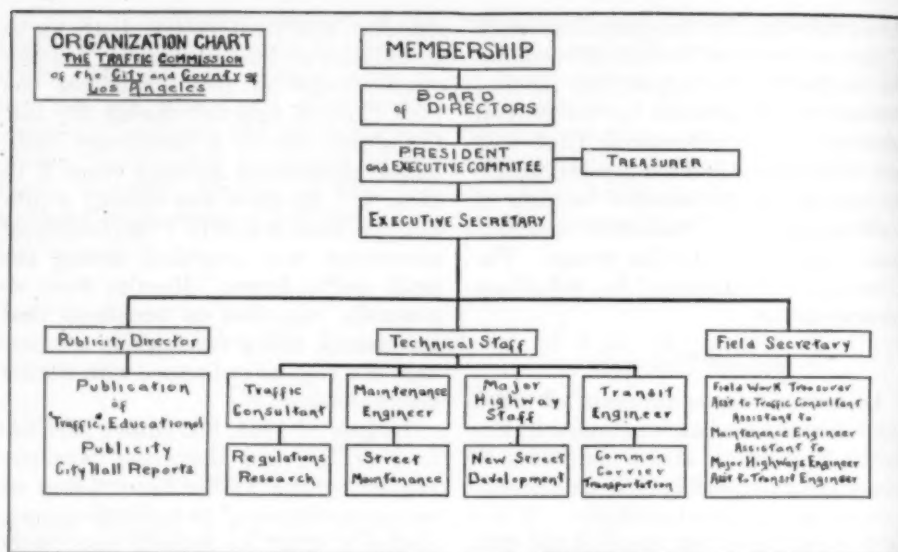
(1) Do not drive in excess of *Fifteen miles per hour* by schools when children are entering or leaving.

(2) Do not drive into school crosswalks marked with yellow paint when there are pedestrians in the crosswalk on the right half of the roadway. Under such conditions you must *stop and wait* until the crosswalk ahead of you is clear. When no pedestrians are in the crosswalk you need not stop, but may *proceed with caution*.

(3) Co-operate with the Police Department in making the streets safe for both motorists and pedestrians.

Courtesy

LOS ANGELES TRAFFIC COMMISSION.



Another phase of the work of the regulations committee has been its effort in the field of enforcement. It has assisted authorities in bringing about a *courteous* enforcement of the law. It has fought vigorously the idea of enforcement for the sake of revenue and has advocated education rather than arrest in the case of all but wilful violators.

Street Maintenance. The important relation of properly conditioned street surfaces to congestion is but dimly recognized in most American cities. Los Angeles in common with the rest has suffered from dilatory methods in making street excavations as well as in repairing broken surfaces.

The Traffic Commission is insistently voicing the idea that a main traffic artery is an integral part of a most vital transportation system, and should be treated as such. It contends that maintenance and repairs should be marked by the diligence which characterizes such work on the main line of a railroad. In pursuance of this policy the Commission has assisted in the passage of an ordinance requiring two

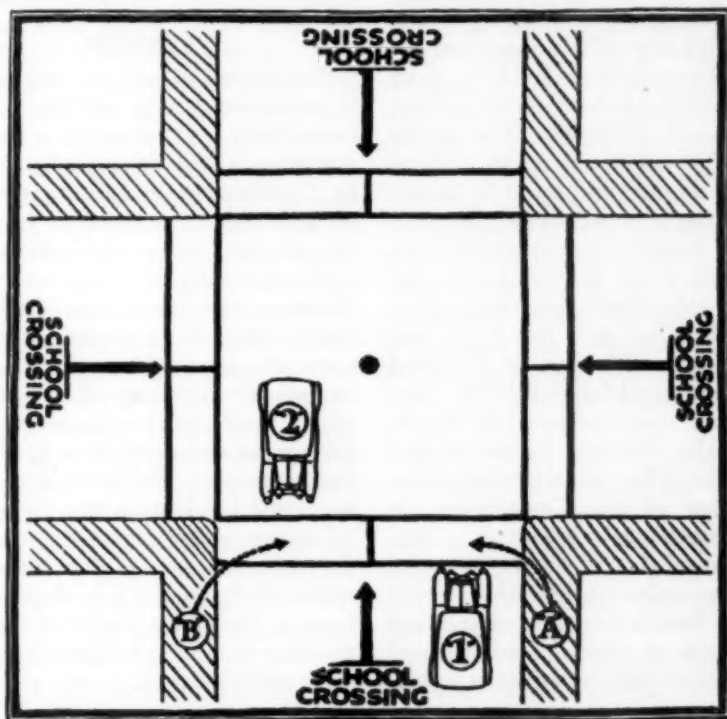
shifts on all street work in the congested areas: in obtaining county help for street maintenance on main thoroughfares in the city to the extent of \$400,000 annually; and recently in the allocation of an additional \$1,000,000 for street repairs from the general funds of the city for the period from July 1, 1924, to July 1, 1925.

Street Development. As has been pointed out, both good judgment and expediency dictated strenuous activities in the matter of regulation and street maintenance in order that capacity use of existing streets might be secured. At the same time the most casual study of the street layout in Los Angeles made obvious the wisdom of developing a well balanced system of traffic arteries through opening and widening the necessary links. Chicago, Pittsburg and St. Louis afford illuminating examples of the beneficial results which followed actual construction under a properly executed plan.

Pursuant to the policy of the Traffic Commission, negotiations were undertaken with experts in street planning,

and Messrs. Harlan Bartholomew, Frederick Law Olmsted and Charles H. Cheney were employed in December of 1923 to draft a major street plan for Los Angeles. This plan was completed and presented to the city July 26, 1924. It is thoroughly comprehensive in its character, and calls for eventual ex-

penditure of hundreds of millions of dollars. Unquestionably the carrying out of even a limited number of the projects will result in doubling the traffic capacity of certain areas of the city. A program committee consisting of the high officials of the city government and the heads of the leading civic



MOTORISTS MUST HEED NEW SCHOOL STOP REGULATIONS

The board of police commissioners is hereby authorized and directed to place and maintain crosswalks at the intersections of streets in the vicinity of public schools within the city of Los Angeles, at which, in the opinion of said board of police commissioners the travel of traffic is sufficiently heavy to render dangerous the crossings of the intersection by school children.

The crosswalks shall be indicated and maintained by two lines of yellow paint upon the pavement approximately fifteen feet apart. Said board of police commissioners is further authorized and directed to place and maintain with yellow paint the words "school crossing," together with an arrow pointing in the direction of the above-mentioned crosswalks, said words and arrow to be painted upon the pavement 100 feet from each crosswalk.

Within such crosswalks pedestrians engaged in crossing the street shall have the right of way over all traffic, provided, however, that when traffic at the intersection is directed by a police officer or by a signalling device, pedestrians shall be subject to the same directions as govern the movement of vehicles.

It shall be unlawful for any person driving any vehicle, animal, street car, interurban car or train of cars, to drive into any of the above-mentioned crosswalks when there is present in said crosswalk a pedestrian upon the right half of the roadway, engaged in crossing said street.

organizations is now engaged in selecting a primary program of projects from this plan.

Public Transportation. While Messrs. Bartholomew, Olmsted and Cheney were engaged in a study of highway problems, the Traffic Commission had recommended to the city the employment of experts to make a similar study of transit facilities. The firm of Kelker and DeLeuw of Chicago were retained and expect to make their report to the city within a short period of time.

Educational Publicity. The whole subject of street traffic in its modern aspects is so new and so little understood by the general public that it is absolutely essential that every item in a program of relief be thoroughly explained in order that opposition may be forestalled. Change is inevitably met by suspicion which can be dispelled only by frank and full publicity. The newspapers, metropolitan and neighborhood, the theatres, billboards and hand bills have been used by the publicity director of the Commission in various campaigns where public support was needed. When the new city charter was under consideration the aid of the Boy Scouts was enlisted and tens of thousands of pieces of educational literature were distributed to the voters.

The Commission has been fortunate in that the publishers of the most important papers have been deeply interested in the work being done, and have been generous in their allotment of space. It is the purpose to shortly embark upon the publication of a magazine, *Traffic*, which will be circulated among the influential groups in the city.

SUMMARY

The success of any civic organization is measured by its usefulness to the community. Whatsoever accomplishments have been achieved by the Traffic Commission in Los Angeles have resulted first, from the deep interest of its members in the subject, and, secondly, from the fact that its board of directors is representative of all groups vitally affected by traffic. Here railroad men, merchants, automobile men, city planners and city officials meet and adjust view points quite often of wide divergence and agree to support a unified program. The inevitable discouragements incident to any civic undertaking have only served to strengthen the determination of the directors to stick closely to the job of getting the facts in the many phases of the traffic problem and act intelligently on these facts when secured.

The Export Trade in Automobiles

By H. H. KELLY

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THE romance of American business holds no more interesting chapter than that which deals with the rise of the automobile industry. And that industry has no more interesting or significant phase than its export trade.

Two sets of figures furnish the background for a discussion of foreign trade in automotive products. Both refer to 1923. There were in operation in the world that year 18,000,000 passenger cars and motor trucks; 15,000,000 of this number were in the United States. The world production of these vehicles in the same year was about 4,500,000; America produced 4,087,000 of them, and 107,000 more, if American cars and trucks assembled in foreign countries are counted. These are the brief statistics which show America's position in the automotive business of the world—83.4 per cent of all vehicles in operation, and 93.2 per cent of the annual world production.

Nineteen twenty-five will be the jubilee year of the industry in the United States. After less than a quarter century, the American automobile dominates the world. But twenty-five years are not a day; and the growth of the American automotive industry during that time has been logical and sound. The concentrated force of twenty-five years of successful effort is now behind it, pushing it outward into new fields and new markets—in a word, into export trade.

RAPID GROWTH OF EXPORT TRADE

No one knows just how large, or how small, were the foundations of this

towering structure. In 1895, perhaps 300 vehicles were produced in America; by 1900, the number may have been 5,000. Export trade was hardly thought of. For the first and last time, imports probably equalled exports, although the numbers were so negligible as to have left no impression upon the records. It was not until 1910 that either production or exports really began to merit attention, but in that year, 187,000 cars and trucks were built and 8,500 were shipped abroad—about 4.5 per cent. The proportion at present is 6 per cent, exports having more than kept pace with the tremendous growth of the industry.

From 1910 onward, production of cars and trucks grew by leaps and bounds; each year set a new record, only to be eclipsed by the next. The increase in production from 209,000 in 1911 to 4,087,000 in 1923 summarizes the amazing story.

After 1910, the exports grew in like measure—from 15,800 in 1911 to 221,816 in 1923.

The dollar-value of the industry and its exports in the single year of 1923 ran into enormous totals. The wholesale value of all motor vehicles and parts, including tires, produced that year was estimated at \$2,800,000,000. The retail value was at least 25 per cent more, or \$3,500,000,000. The value of the exports was placed at \$170,000,000 for the United States, and \$37,000,000 for Canada. The magnitude of these figures is best seen in the fact that the United States shipments of automotive products stood third among all commodities exported, being exceeded only

by unmanufactured cotton and refined mineral oils. Canadian exports, moreover, should be added to those from the United States, for they come from branch factories of companies organized in the United States, placed there to take advantage of tariff preferentials in the British Empire.

In comparative value of items, passenger cars form by far the largest portion of the exports; after them come trucks, then motorcycles, accessories, parts for assembly and replacement, and engines.

One of the most interesting features in all this notable development is the increase in the number of cars and trucks assembled abroad. The products of some of these foreign-assembly plants, as they are known in the industry, may be only partially American, although they are built by subsidiaries of American companies and under American patents; they may use local materials in large measure, and they do, of course, employ workmen of the country in which they are located. One such plant in England advertises that 80 per cent of its product is British-made. In practically all these assembly plants, however, the engine, the heart of the car, is a "Made in U. S. A." product. Last year, foreign assembly plants turned out a total of 107,000 cars and trucks. One American company now has twelve such plants in operation in various foreign countries. As foreign markets improve this phase of the industry may be expected to take on an ever greater importance.

FOREIGN MARKETS

Leading national markets for our automotive products are a kaleidoscope of changing conditions. They differ according to the specific products which they prefer, and they move up and down in their positions from month to

month. Sometimes their rise and fall can be assigned to certain known causes; at other times, their movements are apparently without reason at all. None the less, every export manager watches their fluctuations with keen interest and checks his foreign sales force accordingly.

Australia is by far the best market for American passenger cars. Last year, 25,817 cars, valued at \$20,000,000, were shipped to that market, and in the first six months of this year the shipments almost equalled those of all twelve in 1923. Many an Australian industry owes its origin and development to this growing flood of American vehicles. Builders of bodies for both cars and trucks, for instance, have found a prosperous business in equipping chasses, and they have been protected by an Australian tariff which imposes a high duty upon imported bodies. Tire-makers, too, and manufacturers of accessories and parts, base their operations upon the imports of American vehicles. Despite all this manufacturing activity, it is curious to note that no successful all-Australian car has yet made its appearance.

After Australia in the table of national markets come Canada, the United Kingdom, Mexico, Sweden, Argentina, Spain, Cuba, and so on down a long list, with not a single country in the world, large or small, failing to receive some of our passenger cars.

For trucks, the demand is not the same. Japan led in 1923, and still is in first place so far in 1924, largely by reason of large purchases following the earthquake. Exports of trucks to the Sunrise Kingdom last year numbered 5,111, valued wholesale at \$1,670,000. Second in the truck list stood Belgium, and then followed Australia, Sweden, Canada, Spain, the United Kingdom, and a list of others as long as that of the passenger car markets.

The sudden rise to prominence of Japan as a buyer of American motor trucks is an example of the unexpected in export trade. In 1922, Japan bought only 1,001 trucks and busses. Following close upon the heels of the earthquake in September of 1923, which laid to the ground two of Japan's chief cities, came the first rush orders for trucks. Rail communication, both steam and trolley, was completely disorganized, and the island kingdom found emergency measures necessary to transport goods and passengers in the devastated areas. The trucks came—1,800 in a single month—mostly from America. Bus routes appeared, with passengers jolting uncomfortably in hastily-built bodies mounted on ordinary truck chasses; freight-lines of motor vehicles took the place of the railroads; taxi-lines boomed. Japan was motorized in a month, and a new and modern means of transportation was literally forced upon the country by its own dire need. The effects of that impetus to motor-transport in Japan will never be entirely lost.

UNFORESEEN PROBLEMS AND EMERGENCIES

Peculiar and abnormal conditions still exist in many countries as a result of the war. There is Germany, whose automotive trade and industry have been as hard hit in recent years as any other part of her economic structure. Since August, 1914, Germany has practically been off the list of buyers. During the war, the uncertainties of maritime commerce cut down her imports to a minimum; after the war, she herself refused to permit the importation of many products, among them automobiles, and her decision was enforced by her inability to make payment. Today Germany is operating under an import-license system, which limits imports to cars for demonstra-

tion purposes or for the use of diplomatic officers and travelers. Recent flurries have been created by rumors of the removal of these restrictions, by the evacuation of the Ruhr by France and the changing of customs barriers, and other occurrences; but to date the import-license system remains unaltered, and apparently will remain so for some months to come, at least. If the licenses are abandoned, the German automotive industry, which before the war was growing rapidly, will in all likelihood receive protection behind a high tariff wall.

Export managers in the automobile business find few dull days, for the greater the number of foreign countries in which they place their goods, the greater the chance that each morning will put before them some new and unforeseen problem. Thus, within recent months the King of Spain signed a decree requiring all automobile tires and tubes entering Spain to be stamped with a serial number—this to check the smuggling of tires, which was reported mounting to large proportions. Not only was the number to be stamped on the tire and tube, but it was to be recorded on the invoice accompanying the shipment as well. The difficulties attending this order are manifest; yet American exporters met its requirements and continued shipping tires to Spain.

On another day, more recently, cables brought the news that Portugal had stopped, without warning, all imports of motor vehicles weighing less than 6,600 pounds, excepting only those already in transit. Since few vehicles weigh more than 6,600 pounds, this effectually put a stop to all imports for a time. Portuguese authorities explained that the order was issued in the belief that the curtailment of foreign purchases would tend to improve the financial condition of Portu-

gal. Early in October these severe restrictions were lightened, and admission of vehicles weighing up to 3,300 pounds was authorized.

WHY AMERICA UNDERSELLS

Manufacturing is in a high stage of development in many other countries besides the United States. Why is it that they are not able to supply their own automotive needs? Why is it that America can ship a car to a foreign country, with all the attendant expenses of land and ocean freight and tariff charges, and still undersell the foreign manufacturer in his own territory? The explanation lies in the enormous size of the domestic market which supports the American automotive industry. For that market, which

is now assimilating 94 per cent of our total output, has permitted the evolution of "mass-production" methods and thus has made possible low prices for our cars and trucks which foreign makers have never been able to equal.

Beyond question, foreign markets for American motor cars and trucks will loom larger and larger as the years go on. Today America is exporting 6 per cent of its automotive production. In the tomorrow of the coming years, no man can predict how high this figure will go. Certain it is that it will move steadily upward as the domestic market stabilizes and foreign fields continue the development which already has placed America in an unapproachable position of world leadership in motor transport.

The Relation of the Automobile Industry to International Problems of Oil and Rubber

By HARRY T. COLLINGS

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THE automobile industry was first shown as a separate business in our census of 1904. Twenty-five years ago there were in this country only 3,700 vehicles propelled by gasoline. The table below shows the growth of the industry up to the beginning of the war.

Our Government statistics show that in 1923 exports of passenger cars from the United States numbered 127,035,

valued at \$90,692,272; and of trucks, 24,861 valued at \$15,318,058. The total value was \$106,010,330. To this should be added the exports from Canada—57,481 passenger cars valued at \$29,325,031; and 12,439 trucks valued at \$4,503,659, making a grand total, therefore, of 221,816 passenger cars and trucks, valued at \$139,839,020. The automobile industry, then, constitutes one of the most im-

GROWTH OF THE AUTOMOBILE INDUSTRY (INCLUDING BODIES AND PARTS)

YEAR	NUMBER OF ESTABLISHMENTS	CAPITAL (THOUSANDS)	WAGE EARNERS	VALUE OF THE PRODUCT (THOUSANDS)
1899.....	57	\$5,769	2,241	\$4,748
1904.....	178	23,084	12,049	30,094
1909.....	743	173,837	75,721	249,202
1914.....	1,271	407,730	127,092	632,831

portant branches of our present-day industrial life. But in the consideration of its importance we must by no means confine our thinking to the manufacture of automobiles. The petroleum and rubber industries as well have grown to a magnitude which ranks them high among our industrial enterprises. This position they occupy chiefly because of their relation to the automobile. Tires, tubes and motive power for the automobile are responsible for the commercial importance of the oil and rubber industries.

It is the purpose of this paper to point out the influence which the automobile has exerted on these enterprises, and more particularly to indicate the international problems which have consequently arisen in connection with their development in recent years. Without pneumatic tires and gasoline the automobile is merely a steel skeleton, as dead as the chariot of Pharaoh. The cushion tire means speed and luxury; the gasoline engine revolutionizes locomotion and converts a "horseless carriage" into a limousine.

OIL—SUPPLY AND DEMAND

In the sixty-five years since Edwin L. Drake struck oil near Titusville, Pennsylvania, the petroleum industry has grown to be one of the most important in national and international trade. That this is not solely due to the automobile is obvious; crude or semi-refined oil is used extensively as a fuel by locomotives and steamships, and in a more limited way as a lubricant. Its principal use, however, is in the form of refined products, of which gasoline is the most important, and this is consumed chiefly by the automobile and motor truck. The importance of the automobile in the development of the petroleum industry, therefore, is apparent; a consideration of their relation deserves attention.

The United States Geological Survey estimated in 1921 that we had used up five billion barrels of our original supply of fourteen billions, so that less than two-thirds of our original resources were left. The world outside the United States was then thought to have some fifty-six billion barrels or over 90 per cent of its original resources. As the United States was producing three-fifths or more of the total annual output of oil, each year placed the country in a relatively worse position. Not only was the increasing number of automobiles and trucks continually demanding more gasoline, but a larger proportion of each year's supply was being refined for the production of gasoline. In the early years of the refining industry 10 to 13 per cent of the petroleum refined was converted into gasoline; by 1914 this percentage had increased to 18, and in 1921 over 28 per cent of the crude oil distilled was used in this way. Doubtless more than one-third of the petroleum products this year (1924) will be in the form of gasoline. With a production of 2,287,412 passenger cars alone during the past eight months, there can be little doubt that the automobile is a controlling factor in our petroleum industry.

No raw material since 1914 has been the cause for more international complications than has oil. This has not been due solely to its use by automobiles, but this has had an intimate connection with the problem. In times of war, nations need crude oil for their navies and gasoline for their airplanes; and the movement of troops, of ammunition, and other supplies is carried largely by the use of motors. In times of peace, the consumption of such vast quantities of gasoline by automobiles renders difficult the storing of an adequate supply for war needs. Hence the struggle for oil. So the automobile in peace or war bears no small part in

international oil problems, and these have bulked large in diplomacy since 1914.

THE STRUGGLE FOR OIL

Did not the British Government in 1919 make clear that it had "floated to victory on a wave of oil," and that this kind of wave must in future be ruled by Britannia? And did not the British Cabinet at that same time decide that vast stocks of oil must be provided both at home and abroad at naval coaling stations? Since crude oil and gasoline have become the "soul of modern warfare," the world's oil resources have been carefully studied with a view to the control of adequate supplies against a time of strife. A committee of the British Government had been appointed late in 1918, with the ominous title "Petroleum Imperial Policy Committee," whose admitted task was to find and control in various quarters of the globe the precious oil supply. Arrangements were made with the Royal Dutch-Shell, Anglo Persian, and other oil companies, as a result of which Mr. Pretymann, at the laying of the corner stone of the Anglo Persian Oil Company Refinery on May 7, 1919, could say: "When adjustments are completed the British Empire will not be very far from controlling one-half of the available supply of petroleum in the world." On April 24, 1920, came the San Remo Oil Agreement, which because of misunderstandings in both France and the United States led to international complications.

Nor were our efforts to obtain adequate oil supplies for the United States less strenuous. The press called our attention to the fact that the millions of vehicles propelled by gasoline were rapidly exhausting our available supplies of oil; that we were using gasoline faster than we produced it, thus making inroads into our reserve stock. We

were bidden to stop the export of such vast quantities of oil each year in order to conserve the home supply. The press was insistent that we secure control of adequate foreign sources. Then came our efforts to develop with American capital oil fields in Venezuela, Colombia and Peru.

Mexico had long been in the public mind in relation to world oil problems. There were not wanting those who maintained that the difficulty in the recognition of the Mexican Government under President Obregón was in deference to the oil interests of the United States. This was far from true, but it cannot be denied that oil interests were involved in the problem. There was a real and defensible basis for the refusal of Secretary Hughes to recognize the Obregón government previous to August, 1923. It must, however, be admitted that without vast oil fields in Mexico there would have been no investment of \$200,000,000 of American capital, and without this investment the arrangements for the ownership of subsoil properties, made in Article XXVII of the Mexican Constitution of 1917, would not have concerned us. But our need for oil and our investment in Mexico made us at once an interested party, when that Constitution declared that the ownership of all minerals or substances found in the subsoil is vested in the Nation, —especially when the Mexican Government proceeded to assume this ownership without compensating those who had previously held full title to these properties. Oil was then the vital question between the United States and Mexico from 1917 to 1923.

THE SEARCH FOR RUBBER

If the automobile is of importance to the petroleum industry, it is infinitely more so in connection with the rubber industry. The United States

consumes two-thirds of the world's rubber annually but, except for a small supply coming from the Philippines, we produce none. We are therefore dependent on foreign sources for our crude rubber. Automobile tires and tubes consume at times over four-fifths of all crude rubber used in the United States; thus the automobile introduces us to international rubber problems. Reference to the following table shows that an abundant supply of crude rubber is an increasing necessity, if we continue to supply our automobile needs.

PRODUCTION OF AUTOMOBILE CASINGS AND TUBES IN THE UNITED STATES

YEAR	AUTO CASINGS	INNER TUBES
1914.....	8,021,371	7,907,351
1919.....	32,835,509	33,255,410
1921.....	27,297,919	32,082,002
1923.....	45,362,747	56,933,646

Previous to the year 1906 more than 99 per cent of the raw rubber of the world came from Brazil. Since 1921 less than 10 per cent has come from that country. This change from the wild rubber of Brazil to the plantation rubber, cultivated chiefly in the Federated Malay States, Sumatra, Borneo and Java, has brought with it international problems of great import. Rubber and coffee are the two commodities on which the economic welfare of Brazil depends. To have plantation rubber increase from a production of only four tons in 1900 to over 300,000 in 1920, while Brazilian production decreased from a maximum of 42,000 tons in 1912 to less than 20,000 in 1921, means to Brazil a loss of purchasing power which seriously affects its whole economic life.

More important still, at least as far as the United States is concerned, is the fact that the change of source for

rubber from Brazil to the East Indies placed the control of this commodity largely in the hands of the British, or the British and the Dutch, which at once raised an international question. One of the results of the World War was an aversion to dependence on a foreign nation for raw materials used in a key industry. With 95 per cent of this product coming from British and Dutch possessions, close together geographically, it would be, as an Assistant Secretary of Commerce of the United States epitomized the situation, "a comparatively easy feat for any first-class power completely to cut off our supply in the event of war."

The Department of Commerce asked Congress for an emergency appropriation of \$500,000—\$400,000 for the Department itself and \$100,000 for the Department of Agriculture. The government did not intend to enter the rubber business; it wanted to find a source of rubber which would be near at hand or at least not subject to restriction and interference by a great foreign power. The appropriation was granted and an American Rubber Commission headed by Dr. W. L. Schurz, American Commercial Attaché in Brazil, spent some eight months of 1924 in the Amazon district investigating the possibilities of establishing the production of Brazilian rubber on a sounder economic basis. The final report of this commission has not yet appeared, but preliminary reports indicate the possibility of financing with American capital a \$10,000,000 rubber plantation, either in the State of Pará, Brazil, or in Liberia, Africa. Arguments seemed to favor the Brazilian state until the outbreak of the São Paulo revolution, July 6, 1924. Such a disturbance in what was supposed to be the most stable state in the republic naturally made investors wary of placing \$10,000,000 in Pará.

INFLUENCE OF RUBBER DEMANDS ON
PRICE FLUCTUATIONS

But the demand of the automobile tire and tube for rubber had more to do with the remarkable fluctuations of rubber prices from 1905-1921 than did the change of source. The peak prices for rubber reached in 1910 were due to its greatly increased use for motor cars, a use which up to that time had increased much more rapidly than the output. The high prices received for rubber in 1910 (\$3 per pound) led to a great speculative boom in rubber planting, company after company being formed in London. The war, with its abnormal demand for tires and tubes and with its phenomenal increase in the manufacture of passenger cars throughout the world, absorbed a supply of rubber which under ordinary circumstances would have been far beyond the world's needs. The low prices of 1922 (13½ cents per pound) were partially due to the world-wide business depression and to the lack of buying power in Germany, Russia and other European countries, but the slump in prices was in no small degree caused by overproduction.

When in that year the governments in control of the plantations stepped in to raise the price by reducing the area cultivated, the automobile led again to a knotty international problem. British investors claimed that the ruinously low prices of 1922 did not permit a return of even 3 per cent on the more than \$600,000,000 of British capital invested in the East Indian rubber plantations. So serious was the state of the rubber industry during the years of post-war deflation that the Rubber Growers' Association suggested the

production be reduced 25 per cent for one year from November 1, 1920, and in 1921 proposed a further reduction of 25 per cent. Owing to lack of co-operation these suggestions did not materialize and the situation grew worse. In October, 1922, the British Colonial Office recommended the British Rubber Restriction Act, which materially decreased production.

At once American users of rubber were concerned. On the day the restriction plan was put into effect the price of rubber rose 10 per cent. On November 1, 1922, less than a month after restriction became effective, prices had risen 50 per cent, and during the first four months of restrictive legislation the price of raw rubber soared 150 per cent. An Assistant Secretary of Commerce of the United States characterized the curtailment of the production of rubber as "economically unsound and wrong" without, of course, implying that this temporary expedient was unjustified in its attempt to save large British investments. But an international query appears forthwith. If government intervention may raise the price of rubber to save British fortunes, why may not the Japanese Government do likewise for raw silk, or the Chilean Government for nitrate, or the American for wheat or cotton?

The automobile industry occupies a prominent place in our industrial organization. Without adequate supplies of rubber and gasoline it is doomed. Rubber is and will always remain for us an exotic product; gasoline consumption may within a decade necessitate imports of crude oil. Obviously the automobile is linked with international problems of oil and rubber, and these are still unsolved.

The Rubber Industry and the Automobile

By J. WALTER DRAKE

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NEARLY half of the families of the United States have automobiles. There are fifty or sixty millions of our people using this indispensable means of individual transportation. We have indeed a motorized country. The horizon of our people in a social and economic way has been so widened by the introduction of the motor vehicle and the modern highway that the whole national life of America presents an astonishing comparison with that of other countries.

Twenty years ago a large part of our country, even including the cities, was in a frontier condition as to roads. With the phenomenally quick acceptance of the automobile and its adoption into the daily life of Americans, there has been a parallel development of highways. Together they furnish a system of individual transportation which is so commonly in evidence in every direction that we hardly comprehend its extent and effect. It has had a far-reaching influence in bringing to our citizens an enjoyment of comforts and conveniences of living far beyond those of any other country in the world.

Except for rubber, the phenomenal development of the automobile itself and of a nation-wide system of improved highways would not have been possible. The automobile upon hard tires would not have been so quickly accepted as a convenient and comfortable means of transportation, nor would the modern science of road building have been able to cope with the problem of durable highways, subjected to the hard tires of countless thousands of rapidly moving, heavy vehicles. The shock of constant vibration would have

presented a serious difficulty to the manufacturers and designers of the automobile. America, with sixteen million automobiles running on steel tires over concrete pavements, would be an inconceivably noisy place to live in.

DEPENDENCE OF MOTOR INDUSTRY ON RUBBER

Wonderful as has been the development of the automobile industry, that of the production of rubber, and especially of plantation rubber, runs side by side with it. Four-fifths of the rubber used in this country today goes into tires. Every car owner requires an average output of one-eighth of an acre of rubber trees. Automobile equipment during the year 1923 required crude rubber to the value of approximately \$150,000,000, but at the price prevailing five years before, the value would have been twice that amount. Practically all of our rubber comes from the eastern tropics, Malaya, Ceylon and the Netherlands East Indies being the chief producers. We use about 77 per cent of the world export of this commodity, valued in 1923 at approximately \$240,000,000. In these figures is presented to industrial America a problem of vital importance.

The automotive industry is one whose wonderful and rapid development has made it quickly possible for it to seize a dominating position in the markets of the world; this has been contributed to more than anything else by typical American ingenuity and resourcefulness and the readiness to develop and adapt to the manufacture of motor vehicles every device of modern mass production. Furthermore,

the home market of this motorized nation furnishes, and will continue permanently to furnish, a basic demand for the product of our automobile factories that will enable them to continue their hold upon foreign markets and extend into new and hitherto untouched fields.

Of all materials used in automobile construction, rubber, which is so indispensable, is practically the only one of importance which is obtained from sources wholly under foreign control; and in the mere statement of this fact we should see a warning. If we would continue to enjoy the benefits, in both our domestic and foreign trade, of our outstanding position in the manufacture of automobiles, we must likewise apply our American business sense and foresight to safeguarding our national supply of rubber.

METEORIC GROWTH OF RUBBER INDUSTRY

Most of us are probably familiar with the story of an Englishman named Wickham, who collected a shipment of rubber seeds in the Brazilian forests in 1876, chartered a steamer and took them to London. They were planted in Kew Gardens and the same year seedlings were shipped to Ceylon with a view of experimenting in the transplanting of the *Hevea* tree from its habitat to the eastern tropical countries owned by Great Britain. The chief motive thus far was scientific, but the results have been far-reaching in industry and commerce.

In the late 70's of the last century, the coffee industry in Ceylon had been wiped out by disease, and the planters, having turned for a time to tea culture, found themselves at the opening of the present century interested in the possibilities of rubber production. They were getting unprofitable prices for their tea, while rubber was selling at a

price which appeared to offer a great field for those who grew it under plantation conditions. The planting therefore spread with great rapidity, but because it requires five or six years for the rubber tree to develop to the point of production, it was not until 1907 that there were substantial exports of plantation rubber from the East. In that year a total of a thousand tons was reached, and in the same year the amount of wild rubber that came into the market was 68,000 tons. That small percentage of plantation rubber was sufficient, however, to indicate its possibilities when grown on a commercial basis.

From that time on the growth of the plantation rubber industry was astounding. Rubber, which fifty years ago was used largely for foot wear, water-proof clothing and in some lines of mechanical goods and druggist sundries, came into a dominant position in world trade as suddenly and surely as did the automobile. Each depends upon the other. Modern science, which through Wickham in 1876 with almost prophetic vision had experimented in the commercial development of the rubber tree, had again made possible the development of a wonderful industry, destined to be one of the most important factors in the prosperity and happiness of the human race.

A RUDE AWAKENING AND ITS RESULTS

It has already been pointed out that the sources of our crude rubber are under foreign control. In one way or another Great Britain controls 75 per cent of the rubber industry. Holland exercises political control over some 29 per cent thereof, including the British-owned estates in her colonies; America, on the other hand, owns only about 2 per cent of the plantation rubber area. These facts, which have been published

before, cannot too often be brought to the attention of American business men. This situation, which has been developing over a period of years, was forcibly brought to the attention of this country in the year 1922, largely through the efforts of the British to save the rubber industry from disaster through ruinous prices brought about by the then over-stocked condition of the rubber market. The act by which a remedy was sought by the British for this situation, known as the Stevenson Restriction Act, was designed to secure a standard production to be regulated and based upon the output for the year 1920. The contraction or expansion of production was to be secured by the increased percentage of release based upon the increased market price or a contraction if the market price should fall off. The effect was in fact calculated to impose an obnoxious and detrimental foreign control over the sources and price of the crude rubber requirements of this country.

Something of this sort was needed to shock our manufacturers into a realization of their situation with reference to the control of this commodity so necessary to American industry. The fact that the foreign countries in control of rubber were openly taking steps to control production and regulate the price in the world market crystallized public attention on the situation. Congress was induced to appropriate funds for an

investigation of the sources and production of crude rubber and other commodities under foreign control. Under the direction of the Department of Commerce, investigators were sent abroad to study the matter in all its phases and gather all the facts as to the nature and the production of rubber and its adaptability to other countries where it is not now grown. Experts were sent to the Philippines and to Latin-America to study the possibilities of establishing an industry of our own. These men pushed into every corner of the rubber-growing sections of the world. They were experienced and equipped to get all the facts and assemble and correlate them so as to present the whole subject fully to the American people. Some of the results of this investigation have already been published, and it is a pleasure to know that the leading men of this country, interested in our source of this raw material essential to their industrial future, are giving earnest attention to the problem of our future supply. There is no material now in sight as a substitute for rubber for automobile tires. The facts that have been gathered and marshalled into a convincing case call for action. I have no doubt that the great automobile industry and those allied with it will not fail to safeguard themselves in this important item of our national industry and trade by ensuring against a further foreign domination and control of crude rubber.

The Development of the Foreign Oil Policy of the United States

By HENRY C. MORRIS

Formerly, Chief of the Petroleum Division, U. S. Chamber of Commerce

THE factor of most vital importance in the amazing development of the automobile during the past two decades is the equally astounding and coincident growth of the petroleum industry. Each was dependent upon the other to a degree even yet hardly realized by the man in the street.

By no stretch of the imagination can we conceive of the demands for kerosene and the other products of crude—without gasoline—stimulating the oil industry to the growth of the last decade, for which the insatiable appetite of the internal combustion engine for gasoline is most largely responsible.

Neither can we think of the development of the automobile as possible without cheap and efficient fuel, which petroleum alone could supply.

AWAKENING OF U. S. TO OIL PERIL

The war and its aftermath of economic writing for popular consumption, brought home to the thinking people of this country the fact that the United States, in order to supply the ever-growing demand for automobile fuel and lubricants, not only for foreign but even for domestic consumption, was—and always has been—drawing upon its own supplies of crude to a much greater extent than any other section of the world and was therefore depleting an irreplaceable asset at truly alarming extent. The fact, however, that practically every demand for petroleum products in this country had been met from United States production and from Mexico, and the success of the wildcatter in constantly extend-

ing the producing areas or in finding new ones, had largely obscured the question of future supplies to all but a very few of the larger companies. Indeed, it is a question if even their quests for foreign sources of petroleum were not principally induced by their desire for production nearer their foreign markets, rather than their desire to conserve their resources in the United States and provide for future home supplies.

The lesson taught by the war, however, changed this attitude very materially and also resulted in the tardy awakening of the United States Government to the situation facing our nationals, in their more energetic attempts to obtain control of potential producing areas in the most promising territory abroad after the war.

Some attempts had been made by Mark Requa of California and others to fix the attention of our government upon the question, but no lively interest was manifested until after the close of the war. For several months prior to the Armistice, Messrs. Naramore and Perdue, of the Bureau of Mines, Department of the Interior, had represented the United States Government in the Allied European countries in matters of petroleum supplies and they consequently obtained a vast amount of information on the plans and policies of the larger foreign companies and their governments.

When these men returned to the United States and reported to the then Director of the Bureau of Mines, Dr. Van H. Manning, he was so impressed

by the seriousness of the situation that he instructed Mr. Perdue to present a formal report in detail, which was promptly brought to the attention of the Secretary of the Interior, Mr. Lane. He, in turn, instantly recognized the need for the formation of a definite governmental policy and line of action, and immediately called the attention of President Wilson and Secretary Lansing to certain phases of the situation.

FORMING DEFINITE U. S. OIL POLICY

From this beginning, the demand for reciprocal open-door privileges and quick protests against apparent discrimination, inimical to our companies and nationals, has developed into a fixed policy of the United States Government and has been closely adhered to by the succeeding administrations. The inauguration of this policy and the difficulty of impressing it upon foreign governments is amply attested by the many communications between this government and those of several foreign countries, of which those that have been made available to the public are an indicator of the positiveness of those which have not been so divulged.

The results of this policy are as satisfactory as could be expected, in a country of which the executive policies are so dependent for definite effect upon legislative support as is the case in the United States. The complicated and delicate nature of the negotiations and the difficulty of impressing foreign governments with its continuation have, however, made the endeavors of our State Department more onerous than they should be.

In addition, the very close co-operation between certain other governments and their large oil companies is a factor of immense bearing in the international contests for petroleum fields. Our own government and our foreign-interested companies are working together as closely as possible, under the handicap of deliberate misinterpretation, and petty partisan politics and it is greatly to their credit that the so-called international petroleum controversy has gradually assumed a more amicable aspect, though there are still several irritating—and deliberately unjust—discriminations in Russian, Dutch and British territory. These situations give weight to the arguments of the proponents of reciprocity or retaliation. It is to be hoped, however, that the self-centered nationalistic policies of nations whose present supplies of petroleum products come largely from the United States, while they are either unable to adequately develop their own potential oil resources, or are hoarding them for the future while taking advantage of our leniency, will be altered by force of world opinion.

When the time comes that we suffer even a temporary dearth of domestic supplies, the wisdom of our present governmental attitude and the value of the many foreign petroleum areas, which our companies have acquired, will be more apparent. It is needless to say that then those who have, from the most unworthy motives, attempted to discredit our foreign oil policy, will be the first to acclaim the farsightedness of our oil companies and the endeavors of our officials.

What is the Job of the Trade Association?

By ALFRED REEVES

General Manager, National Automobile Chamber of Commerce

THERE are two types of problems within every business which may be classified as competitive and non-competitive.

Each manufacturer is concerned with the production details of his plant and with the marketing of his particular brand.

He is likewise, with the others in the field, ultimately dependent upon the success of the industry as a whole.

In the automobile field this distinction is rather strikingly illustrated because the motor car and motor truck, owned by millions of persons, operating over public highways, constituting a new form of transportation, are involved in a large number of questions which pertain not to the particular make of vehicle, but to the automobile as a means of travel.

Important as these general questions might be to the individual plants, it would obviously entail a very heavy burden on any particular factory to attempt to represent the industry in such matters, and for any number of companies to do so separately would involve duplication and confusion of effort.

Here, then, lies the job of the trade association. The makers of cars and trucks for a number of years have handled their noncompetitive activities through the National Automobile Chamber of Commerce.

This is a co-operative group, operating not for profit, supported by the manufacturing companies. The policies in its varied line of activities are directed by committee members, who are executives of the member com-

panies, and by a board of directors similarly constituted.

Its field of effort may be broadly divided into:

- (a) Patents.
- (b) Economic Research.
- (c) Commerce.
- (d) Motor Transportation Policies.

The members of this association cross-license approximately 600 patents. This has led to the standardization of a vast number of relatively unimportant parts of the motor vehicle and has permitted the interchangeability of parts, which has worked for great economy in the production of motor vehicles, with consequent low prices to the public. It has saved the industry vast sums which would otherwise have been consumed in law suits. In its automobile patent library, which is the largest in the world, the Chamber has the facilities for determining in advance from the records the probable validity of any proposed patent.

The inventor is encouraged, as under the cross-licensing agreement he has the possibility of a large number of companies using his device, rather than being tied up to one. The progress of engineering is encouraged, as laboratories are freed from the bother of working out minor details and can confine their efforts to more important features of design.

ECONOMIC RESEARCH

The Chamber has a staff which is constantly at work studying the use, distribution and other phases of the motor car and motor truck. It has

issued reports, for instance, on distribution of motor vehicles in the farm field, the relationship of the railroad and motor truck, and the operation of busses by electric lines.

It publishes annually *Facts and Figures of the Automobile Industry*, which includes, from a variety of sources, the latest data on production, registration, use and other details related to the motor vehicle.

COMMERCIAL PROBLEMS

It handles certain commercial problems for its members. For instance, presentations are made regarding railroad freight rates and a freight claims office is provided which checks bills for the member companies. Contact is also made through the association with the insurance companies on matters pertaining to car ratings.

The service managers of the respective companies hold occasional meetings under N. A. C. C. auspices to discuss the improvement of trade practices.

The Chamber holds two annual automobile shows, one at New York and the other at Chicago, at which times, through the massing of their models under one roof, there are afforded exhibitions of sufficient cars to attract hundreds of thousands of visitors.

Foreign trade is promoted through the committee dealing with that subject, which last year arranged the World Motor Transport Congress, and conducts a constant information service which supplies countries abroad with facts concerning motor transportation in this country.

The advertising managers meet for conference semi-annually.

The tests for membership in the organization, demanding that a concern must be an actual producer of vehicles, and not simply a purveyor of promises

and stock certificates, help to maintain high standards.

MOTOR TRANSPORTATION POLICIES

The motor vehicle in public use has created many problems, such as traffic regulation, taxation, highway building, and financing.

The Chamber has a traffic planning and safety committee which campaigns for accident prevention.

Its highways and taxation committees have been studying for years the needs of highway development, the share which the motorist should pay, and the best methods of financing.

The legislative committee, in conjunction with the motor user, dealer, parts maker, and tire associations, has campaigned steadily for a uniform motor vehicle law and has advocated certain principles of legislation.

The industry has tried to stand for policies on these matters which are in accord with the best public interest. It has realized that motor transportation will continue to be popular with the public only as long as its affairs are conducted on that basis.

The automobile leaders, for instance, at one time opposed the Federal expenditure of \$100,000,000 for highways, because there was no provision in the bill pertaining to the economic location of the roads or requiring their maintenance. Though this stand was perhaps temporarily disadvantageous to motor development, the industry took the stand that highway funds should be spent only where economic conditions demand it and that a percentage of the money should always be set aside for protecting the public investment.

Believing that questions of this sort will ultimately be decided by the public through their public officials, the Chamber, after carefully studying all these issues, constantly advocates what

it believes to be the best principles by means of newspaper articles, addresses, pamphlets.

In short, the job of the trade association is to perform those noncompetitive functions for an industry which cannot

as properly or as economically be handled by the individual plants. In so doing, it pools the intelligence of the leaders in the business and through the efficiency of this method of operation, reduces the overhead cost to society.

Serving the Motorist

The Work of the National Motorists' Association

By RICHARD H. LEE

President, National Motorists' Association

THE most amazing progress in the recent history of our country is that of transportation by motor, and it is even more amazing to those who have been intimately acquainted with the constantly unfolding details so necessary to the development of the automobile. As a pioneer in the movement, looking back from this late day, I can almost imagine that the changes have come through some great magic force.

To the layman, the development of the automobile means merely making cars and then making more cars. But nothing could be further from the truth. For it must be borne in mind that, with the development of the manufacture of motor cars, there came the necessity for highways—better highways—and constantly improved highways; for garages and better housing conditions; for increased fuel supplies, conveniently located and accessible to the motorist in time of need; for the creation of traffic and police regulations; the enactment of equitable laws; and innumerable details, which I am sure do not occur to the mind of the ordinary individual, who accepts the development of motor transportation as just one of those things which are.

MOTORIZING CONDITIONS OF YESTERDAY

I can remember as clearly as though it were yesterday a motor trip in 1901 from Cleveland to Cincinnati. To begin with, the motor, so-called, was a real speculation. We had no such things as hard roads and the farmer of that day was perfectly content to travel any road which did not let the buggy down below the hub. We had no gasoline filling stations, and the few people who knew what a garage was were uncertain whether it was pronounced "gar-age" or "garage." There was no state wide regulation; no such thing as a license commissioner. But there was plenty of regulation! In fact, in each county, then again in each town, and once more in each village, there was a keen conviction that the motor car was a thing of evil and that none should ever travel their highways without first paying a fee; second, displaying a large piece of tin prominently placed upon the car, with the name of their particular hamlet painted upon it; and third, in all chance paying a fine for having gone too fast, but just how fast "too fast" was, was not determined. And the courts, rather sympathizing with the viewpoint of the rural community, were inclined

to think that it was not necessary to determine how fast "too fast" was!

Strange to relate, we made the trip, although by the time we reached Cincinnati we were so loaded down with license tags that there was little room for baggage and an ample weight on the springs without passengers.

The automobile, however, came too fast for its critics. The law could not be made to apply with sufficient sureness and swiftness to stop the rascals from scaring the horses. So we arrived at the period where the people took the law in their own hands and built "Thank-ye-Mums": across the highways. Then came the constable and the special constable and the special constable's assistant, with the speed trap and the justice sitting on the front porch on Saturday afternoon holding "court." This was expensive, but delays were obviated by the speed with which the motorist learned to enter his plea of "how much" instead of "not guilty." This was a rather profitable enterprise for the rural officer and has never been entirely eliminated, but looking back at the various stages through which the automobile and its driver have come, down to the present time, when the service to the motorist upon the highway is about as good as the service to a guest in a hotel, I am impressed more with the details which have made the growth of the automobile possible than with the mere manufacturing problems.

WORK OF AUTOMOBILE CLUBS

There are today in the United States more than eleven hundred automobile clubs organized and maintained for the benefit of the motorist on the highway. These clubs are usually controlled by a board of public-spirited citizens in each particular locality. In many cases they are affiliated with a state association, composed of the clubs in

that particular state, and the state association in turn is in most instances affiliated with the national motoring body.

This type of organization makes it possible for the local club to look after local matters, such as the improvement of streets, the elimination of danger points, the sign posting of roads and the enactment of proper local ordinances.

The state organization was created to take care of business which crossed the county lines: the building of state highways and their proper maintenance; the enactment of legislation to provide safeguards for both the motorist and the public, and to handle generally all questions within the state which go beyond the bounds of a particular community.

The national organization was created to take care of national legislation; to provide great national trunk lines connecting the states with hard surface, properly built and well-maintained highways that lead to definite points; to advise with state highway commissioners so that the money spent for highways might give the motorist within the state the maximum of convenience when traveling without the state; and it is also performing a valuable service to the motorist in calling to the attention of the national government the necessity of some aid in the building of highways, which, in a strict sense, are national.

A membership card in one of the local automobile clubs, affiliated with the national organization, to all intents and purposes, makes the member in that club a member of practically every club in the country, and in most instances, through that membership, he is entitled to receive all of the benefits of the other club ordinarily extended only to its own members. This is particularly true of such clubs as the

Keystone of Philadelphia, the Long Island of New York, the Pittsburgh Motor Club of Pittsburgh, the Illinois Club of Chicago, and clubs of that type. In these clubs we find complete touring information for the motorist away from home; they either have garage facilities or they can advise of the best to be had; they will make hotel reservations, arrange for railroad or steamship tickets, or even get tickets for a football game, if you wire them in advance. They maintain an inexpensive towing service, through which the member in trouble upon the highway can be reached by an emergency road car within a short space of time, after telephoning the club. While most of them will not defend speeders, they will nevertheless give every aid to the motorist and will see that he is fairly and justly treated and, if he is being discriminated against, they will gladly procure counsel and make his defense.

In some of the clubs, automobile accessories and supplies can be purchased at greatly reduced rates. In some, insurance is available at rates below the manual. In fact, generally speaking, it is the aim of each local club to provide all of the benefits which the motorist in that community requires and demands.

The clubs as a whole, through their various organizations, are constantly on the alert in campaigns to eliminate grade crossings, to procure more uniform laws in the various states, to protect the motorist from fraudulent schemes and generally to receive specific complaints from the members

of the club and to act upon them in behalf of all motorists.

A very interesting sidelight on the possibility of organized motorists is the orphans' day held by many clubs. On an annual date the members of these clubs provide their motor cars, food, toys and all the necessary machinery and equipment for an outing for all the orphans in their particular town. In one city this outing has been held for a number of years; no children are overlooked. It is held in a large amusement park, where the children are welcome to ride the merry-go-round and enjoy all of the equipment of the park. The children are tagged as they leave the institution, each car is in charge of a man or woman whose duty it is to look after the children in that particular car, and, during all the years in which the outing has been held, not a child has been lost, nor has an accident occurred. On the contrary, the members of the club have come to know the orphans and call them by name. Many of them have taken the same children year after year and through their acquaintanceship have formed the habit of calling upon the children, and in some instances they have been adopted.

Not all the motorists of the country are members of these clubs, but the benefits are general and whether a motorist belongs or not, he is, by reason of their existence, permitted to drive under better laws, over better highways and receives, as a direct benefit, a treatment upon the highway very different from that which greeted the motorist of twenty years ago.

Services of the American Automobile Association

By ERNEST N. SMITH

General Manager, American Automobile Association

BACK in 1902, when the American Automobile Association was formed by delegates from nine small, new motor clubs, there were about 30,000 automobiles in the United States and the new fad of motoring was a vulnerable activity subject to attack from many directions. The automobile, or, as it was then generally called, the horseless carriage, was often referred to as the plaything of the rich, and quite a large faction of the public was openly hostile to it. Politicians, seeking public notice, took a whack at the motorist. In those days windshields were considered dangerous, cars cranked on the side, rubber bulb horns cleared the way, motor lamps were lighted with great difficulty, stout ladies could not ride in the tonneau which was entered by a narrow slit in the rear of the car, and huge goggles and dusters were worn by everyone who ventured forth. A fifty-mile drive made the occupants resemble a wagon load of unwashed laundry. Tires were fearful contraptions to handle and a puncture practically ended the day's festivities. Such words as garage and tonneau were pronounced with difficulty by the proletariat and the gentleman who called to take a lady motoring and who wished to be modest about it, would better have accomplished his purpose by hiring a brass band. The most popular song of those days was "In My Merry Oldsmobile."

At present the association is composed of a band of over 600,000 motorists, most of whom are members of clubs affiliated with the National Organization. Over 90 per cent of all the functioning motor clubs in the

United States belong to the Three A's and many of the clubs, now numbering over 500, are members of state motoring organizations. The system of government is patterned somewhat after our National Government, except that the executive officers and governing boards serve without compensation. The various affiliated bodies are represented on the national boards and all have a voice in the management of the central organization. In the handling of state problems the clubs are banded together into state associations, and such powerful organizations as the Pennsylvania Motor Federation, the Ohio State Auto Association and the New York State Auto Association have been important factors in the formulation of wise motor laws in individual states.

There are several Three A clubs, located in Cleveland, Detroit, Chicago, Missouri and northern California, that have more members today than there were automobiles in the United States when the American Automobile Association was born. Motor clubs have of recent years become the largest civic organizations in their communities, and such Three A organizations as the Columbus, Ohio, club and the Cincinnati, Ohio, club, with approximately 15,000 members; Scranton, Pa., with 8,000 members; Buffalo, New York, with 6,000 members; and Springfield, Mass., and Washington, D. C., with 4,000 members, and innumerable other clubs with a membership of 2,000 and more, will indicate the splendid support that motorists give to organizations operating in the public interest and in behalf of the motorists them-

selves. Such organizations as the above joining in a national service and a national policy give concrete evidence of the interest that motorists themselves take in solving their own problems.

The American Automobile Association has earned a place in history. It was the pioneer in the early recognition of the importance of motoring, and during the past twenty-two years it has taken a prominent part in bringing about the almost universal use of the automobile and in the development of individual transportation.

It has encouraged the building of good roads everywhere. It has frowned upon recklessness and carelessness and violation of the law, and it has promoted wise, just and fair national and state legislation.

It has stood as a barrier against aggression by predatory legislators and against unwise laws proposed often as a result of public ignorance.

David Jameson, a former president of the association, recently pointed out the changes in the activity of the association with the passing of the years. He said:

When this organization was young, its members approached horse-drawn legislatures with clasped hands, praying for clemency and leniency in the application of those weapons with which prejudice and hate too often greet innovation.

You were few, but you were chosen. You were a minority, but you were picked. As good stock ought to do, you grew.

Today you are not simply a majority, you are mighty near the whole thing. You no longer approach law makers asking mercy; you come demanding justice and fair treatment.

It would be interesting, did time permit, to consider at length how the spirit of organized motordom has changed and is changing with the events referred to. We are much less on the defensive, much more

on the offensive. We appeal less, are appealed to more.

Many of the things we sought have been granted. Many of the ends we aimed at have been attained. Our motives have changed.

We have passed from purpose accomplished to responsibility assumed or imposed. Leadership has come to you naturally and inevitably.

You are now the ones most concerned about the marks of identification on your car. You lead in the wise regulation of traffic. The era of good road building has arrived. You have certainly had a large part in bringing it, I believe the largest part.

It is no longer difficult to secure the appropriation of money for roads. They are all doing it. The Federal aid, which your national organization has labored for in season and out of season, has been provided generously.

But let none imagine that our mission is ended, that our work is done. An end accomplished is, as I have said, usually a responsibility assumed. There is more and more work for the motor clubs and their central organization.

Its kind changes, but its quantity increases with the years. We have advocated the appropriation of public moneys. We are in honor bound to assist in its wise expenditure.

The major activities of the American Automobile Association are divided into four groups, although, in fact, they comprise several others. These are:

Good Roads
Touring Information
Legislation
Contests

New boards have been recently authorized, one of which will handle problems relating to traffic and safety and the other with motor transport. An international relations board has been created and a new industrial vehicle division is being formed.

WORK OF A. A. A. TOWARDS GOOD ROADS DEVELOPMENT

The achievements of the association in promoting good roads have been particularly notable. The automobile was born into an almost roadless world and consequently is almost solely responsible for practically all of the highway improvement that has taken place during the past twenty years, and the American Automobile Association, as the national association of motor vehicle users, bore a prominent part in bringing this condition to pass.

As early as 1903 one of the clubs in the association appropriated \$10,000 with which to promote the Brownlow-Latimer Federal Aid Good Roads Bill, the first of its kind to be introduced in Congress. Since then the Good Roads Board of the organization has been actively urging the betterment of national, interstate and local highways.

During the early days of motoring the few motorists who braved the poor roads of the rural districts often encountered farmers who were decidedly hostile to them and quite suspicious of them in spite of the eloquence and sympathy displayed by the motorists in urging the law-makers to build good roads.

The serious participation of the A. A. A. in highway matters began with the convention conducted by the Automobile Club of Springfield, Massachusetts, in 1907. The second A. A. A. National Roads Convention was held in Cleveland in co-operation with the National Grange and the American Road Makers in 1909. The third convention was held in St. Louis in co-operation with the same organizations. Similar meetings were held at Atlantic City, 1912; Detroit, 1913; and Atlanta, 1914, the latter meeting in co-operation with the American Highway Association.

Co-operating with the Association of State Highway Officials, its first Federal Aid Convention was held in Washington in 1912, and the second in 1913, resulting in the establishment of a joint committee of both houses of Congress to study the question. At that time over forty separate Federal aid measures were pending in Congress. During the winter of 1914-15 the House of Representatives passed one measure, known as the Shackleford Bill, and the Senate reported a substitute known as the Bankhead Bill.

The first step toward a comprehensive Federal aid plan, known as the Bankhead Bill, was approved by President Woodrow Wilson on July 11, 1916. At that time John A. Wilson, a cousin of Woodrow Wilson, was president of the American Automobile Association. This bill carried an appropriation of \$85,000,000, apportioned to the states on the basis of area, population and post road mileage, and was to be expended in the succeeding five years on the condition that at least one-half the cost would be contributed by the several states.

In 1919 the American Automobile Association and other organizations urged substantial increases in the Federal appropriations and during that year Congress added \$200,000,000 for Federal aid and \$9,000,000 for forest roads. From 1917 to 1925 Congress appropriated or authorized \$540,000,000 for Federal aid and \$47,000,000 for forest roads—a total of \$587,000,000.

During 1920 and 1921 the A. A. A. and other national organizations worked for a measure which embraced the broad idea of having the National Government build, own and maintain a system of national or interstate highways.

The late Senator Townsend of Michigan, then chairman of the Senate Committee on Post Offices and Post Roads,

sponsored this idea in the Senate. Opposition from the advocates of the original Federal aid plan was sufficiently strong to defeat the Townsend Bill, but a compromise measure, known as the Federal Highway Act, was passed in 1921 and received the approval of President Harding on November 9 of that year. It provided for an interstate system of highways not exceeding 7 per cent of the mileage in each state on which all future Federal aid would be confined, the Federal Government to pay not more than 50 per cent of the cost. Any state which failed to maintain the roads to the satisfaction of the government would forfeit all future Federal aid.

Over \$1,000,000,000 has now been provided by the Federal Government and the states for the construction of this great system, which when completed will embrace about 200,000 miles. Thus America has inaugurated the most gigantic program of road building ever conceived by any nation. When completed it will be 33½ per cent greater than the national systems of all the other nations in the world combined.

Every legitimate effort will be used by the association to expedite the completion of this system. Working through its affiliated clubs, the association has a well-defined program for close co-operation with the state highway departments, under whose immediate direction the national highways are being built. It is the object of the A. A. A. and its affiliations through a campaign of education to help the state highway departments to gain and hold public confidence, to the end that their road building activities may be free from partisan politics and that adequate funds may be provided by the states to complete the national and state systems at the earliest possible date.

CULTIVATING THE TOURING HABIT

To encourage road travel and transportation by furnishing reliable touring information has always been an important part of A. A. A. service. The association issues an annual *Camping and Camp Site Manual* and a *Hotel Directory*. Many of the clubs render a number of useful services to members, including headlight inspection, legal advice and mechanical roadside aid. The latter is truly the Good Samaritan service of the organization and has probably done as much to promote and facilitate motoring as any other service rendered by the organization. There is gradually being extended over the country by the association a network of emergency road service stations for the immediate assistance of motorists in trouble.

The association and many of its member-clubs have for years maintained extensive map departments. Scouts are constantly employed to discover and log the best routes and to note the most important points of historic, scenic and recreational interest. With the national headquarters as its clearing house this information is widely disseminated.

The preparation of a series of historic maps has been begun. The first of these, published in the May number of the *American Motorist*, the association's official publication, shows the main points of historic interest in Virginia. The map is accompanied by 90 pages of illustration and explanatory text. The effect of this has been to give new interest and a new stimulus to travel in the Old Dominion. Similar work is now being undertaken in Florida and this will be followed up in other states.

LEGISLATION

From the first day of its existence the American Automobile Association has

been a leader in the fight for fair and just treatment of motorists. Distinct progress has been made in tearing down the false fabric of unjust laws enacted when the industry was young and lacking in power and influence. The Legislative Board has always been prominently active in the affairs of the organization. It has checked the trend of discriminatory laws and stigma taxation and it has secured the enactment of many national and state laws based on the solid foundation of justice and fair play.

Among the outstanding legislative achievements which have been accomplished through A. A. A. co-operation and support during the past few years, the following are worthy of mention:

- The enactment of the Dyer Anti-Theft Law, which makes it a Federal offense to transport a stolen automobile across a state line;

- Securing Congressional action authorizing the distribution to the various states of about \$250,000,000 worth of surplus war property for road building purposes;

- Encouraging the enactment of certificate of ownership laws to prevent the theft of automobiles in the various states;

- Promoting the enactment of standard headlight laws and uniform traffic regulations and rules of the road;

- Opening of the Yellowstone and other National Parks to motorists;

- Securing national legislation by which several thousand dangerous railroad grade-crossings have already been eliminated;

- Resisting the proposal of the Treasury Department to raise Federal revenue by the imposition of a gasoline and horsepower tax;

- Defeating the plan of the House Ways and Means Committee to place one third of the cost of the Soldier Bonus directly on the automobile owners of the country;

- Defeating the proposal of certain oil interests to place a tariff on all oil and asphalt imports;

Resisting the proposal of certain interests to have every automobile registered, taxed and titled by the Federal Government;

During the past session of Congress the A. A. A. led the fight which resulted in a reduction of \$25,000,000 a year in the excise war tax on automobiles, trucks, tires, accessories and parts.

These successful legislative battles afford striking examples of what may be expected of the organization in the future. The legislative program of the association contemplates the complete elimination of all discriminatory laws and all remaining excise war taxes now levied against automobiles.

CONTESTS

Soon after speed and reliability contests became popular, about 1904, the Contest Board was developed as the official sport governing body of motordom. The national contests for the Vanderbilt Cup and the Glidden Trophy were conducted by the Board during the early days of motoring.

The Vanderbilt Cup was awarded in competition for speed and the Glidden Trophy for reliability. These two trophies did more for the mechanical development of the automobile than any other American prize and these tours and contests have been of the utmost importance to the industry and in perfecting and improving the automobile.

For eighteen years the Contest Board has been supreme in its field. No contest of importance can be staged without its consent and sanction. Its rules have been fairly administered and its efforts have been toward clean sport and improvement in the character, efficiency and economy of operation of the modern automobile.

EFFORTS TO SOLVE TRAFFIC PROBLEM

With the character of the work of the association changing and with the new

emphasis upon traffic regulation and zoning quite as much as upon the development of new highways, the officials of the Three A's are turning toward the solution of traffic problems. It is recognized today that the next ten years will see the construction of super-highways, and the physical alteration of parts of many cities to provide traffic avenues for the new methods of transportation which have come to stay, and the American Automobile Association is doing its share in preparing the public mind to accept the developments that are bound to come, even though great municipal expenditures are involved.

But of immediate concern, and recognized importance, is the question of uniform traffic regulations and signals in cities. The solution of the problem is made more complex by the variety of types of cities and the geographical differences. But a start must be made and the A. A. A. has joined with other important transportation agencies in supporting financially and by appropriate co-operative activity a national conference on street and highway safety called by the Secretary of Commerce. This conference, divided into various sections

of experts, has been at work for weeks and it is expected that before the end of the year the conclusions of this important conference will be placed before the public as a starting point in the universal adoption of constructive traffic rules and practices.

There are over 16,000,000 motor cars in the United States and half of them are owned in communities of 5,000 or more population. Nearly one-fourth of the motor vehicles of the country are owned in the cities of 100,000 population or above. Hundreds of thousands of motor trucks are engaged in interstate traffic. You can travel half way across the United States on motor bus lines and this phase of motor development has just begun.

However much the American Automobile Association may have accomplished in the past, its responsibility has now become the greater because its activities helped materially to create this new commercial and pleasurable manifestation of the present century and its vast resources and its far-flung contacts and the ability it possesses within its ranks can and will be used for the solution of those motor problems which bulk so hugely upon the horizon of the average American citizen.

The Place of the University in Good Roads and Automobile Transportation

By ARTHUR H. BLANCHARD

Professor of Highway Engineering and Highway Transport, University of Michigan, and President, National Highway Traffic Association

THE present status of education for highway engineering throughout the United States is comparable to the standing of the work of the highway engineer, in the mind of the American lay public, and, to a greater or less extent, in the opinion of the engineering profession. The nonrecognition by

legislators of the necessity of placing the control of the administration, construction and maintenance of highways in the hands of well-educated and efficiently-trained highway engineers, is reflected by the expressed attitude of many educators in the allotment of the small amount of time which is devoted

to highway engineering in our universities.

The waste of millions of dollars annually in the United States will continue until the profession of highway engineering is placed on the same basis as structural, hydraulic, sanitary and kindred branches of civil engineering. England, France and other European countries have seen the light. As a result, efficient highway engineers are retained in office, organizations are perfected, methods of construction and maintenance suitable for local conditions are employed and as a consequence the public funds are wisely and economically expended.

It is advisable to call attention to the character of the positions which are being filled today by highway engineers. Such positions are found in national, state, county, municipal and town engineering departments, contractors' organizations and the engineering and research departments of companies manufacturing road machinery and materials used in highway engineering.

NECESSARY EDUCATIONAL GROUND WORK

In order that the civil engineer in embryo should enter on his life work at graduation with as general a knowledge of the field of highway engineering as of other branches of civil engineering, it is necessary that considerable attention should have been given by him to the following subjects: (1) A study of the historical development of highways, exemplifying the inter-relationship between social progress and the improvement of public traveled ways; (2) preliminary investigations, including traffic investigations and highway transport surveys, to determine the amount and character of future traffic; (3) surveying and mapping, peculiar to highway engineering; (4) the theory and design of highways; and (5) a consid-

eration of materials used in and the methods of construction and maintenance of the many classes of roads and pavements which exist, which study would include drainage and foundations. Furthermore, such important subjects as street cleaning and snow removal; the relationship of the construction of car tracks and pipe systems, sidewalks, bridges and culverts to highways; and, finally, the comparison of the essential characteristics of roads and pavements and a consideration of economics, administration and legislation as applied to highway problems should be considered.

It is obvious that to recommend that, as an integral part of all civil engineering curricula, a specific amount of time should be devoted to the study of highway engineering, would be as unjustifiable as the practice of many laymen in seeking for a panacea in the form of one type of road or pavement to satisfy all traffic and local conditions. It is advocated, however, that as much time should be devoted to highway engineering as is now assigned to hydraulic or sanitary engineering, or to railroad engineering. If this plan is adopted, at least three semester hours would be assigned to highway engineering, as a requirement for all civil engineering students.

Educators throughout the United States should seek to elevate the profession of highway engineering in America to the plane of the National Department of Roads and Bridges of France and to provide an opportunity for men engaged in highway work to obtain advanced instruction and training under favorable conditions. The heads of national, state, county and municipal highway departments should be broadly educated, thoroughly trained and experienced specialists in highway engineering and efficient exec-

utives. They should be able to discuss publicly and to solve economically the fundamental problems of highway economics, administration, construction and maintenance. Such men should have a broad educational training in such humanities as English, history, economics, philosophy, political and social science. They should also be well grounded in the fundamentals of pure and applied science which underlie highway engineering and the several branches of civil engineering which are utilized in highway work. After a man has secured his fundamental education in engineering and has had a certain amount of practical experience in highway work, the opportune time has arrived for securing professional equipment through the medium of graduate courses in highway engineering.

WHAT HIGHWAY TRANSPORT EDUCATION SHOULD INCLUDE

What is included in highway transport education? The author conceives that highway transport education should cover the fundamentals of the science, art, economics and business of the transportation of passengers and commodities over highways. Courses in this field will be taken by men looking forward to the profession of highway transport engineering, the motor-vehicle industry, and the businesses of traffic management and highway transport.

In the opinion of some, highway transport may not be considered as belonging to the field of technical training and education. On sober thought, however, it will be seen that this branch of knowledge comes well within the classic definition of engineering embodied in the Royal Charter of the Institution of Civil Engineers of Great Britain, which, in part, is as follows:

The art of directing the great sources of power in nature for the use and conven-

ience of man, as the means of production and of traffic in states, both for external and internal trade.

From the standpoint of highway transport business, courses in this field will be taken by men who desire to equip themselves efficiently for the positions of business administrators, dealers, salesmen and advertisers in the motor-vehicle industry, and executives, operators, traffic managers, motor-truck fleet managers, and dispatchers in the commercial field of highway transport, and in the closely related fields of railway and waterway transport.

What is the demand for highway transport engineers and men equipped for highway transport business? In May, 1920, the First National Conference on Highway Engineering and Highway Transport Education held in Washington, D. C., unanimously adopted the conclusion that 4,000 men should be trained in highway transport each year in universities for the positions heretofore enumerated.

RESULTS OF INADEQUATE TRAINING

Many have misinterpreted the meaning of this conclusion. Emphasis should be placed on the words "*should be trained.*" The representative committee framing this conclusion had in mind the economic and efficient utilization of highway transport in the transportation system of the United States.

What is the present situation in regard to the demand for highway transport engineers and men trained in the business of highway transport?

Many highway departments are not properly designing the highways for even immediate future traffic, because their personnel does not include men who have had the proper training in highway transport to have a vision and adequate background which will enable

them to diagnose the probable development of traffic on a given highway. Or, in other words, to make a highway transport survey, the prerequisite of economic highway design, which embodies all investigations in the field and office which are necessary to efficiently estimate the probable amount, character and effects of the future traffic which will use a given highway during the lives of its several component parts.

Motor-truck manufacturers' organizations are in a chaotic condition, from the standpoint of the proper utilization of men trained in highway transport. Why? In general, they have followed in the obliterated footsteps of companies manufacturing highway machinery and materials. The latter companies originally established departments which were advertised to give unbiased consulting service to their customers.

What was the result? In the first place, it was found impracticable to divorce unbiased opinion from the commercial interests of the organization represented and soon prospective customers began to realize this self-evident fact. Second, disastrous conflict arose between the highway transport engineering department and the sales organization, a natural result to anyone familiar with the inter-relationship existing between the activities of such departments.

In the near future the motor-truck manufacturers of this country will see the light and follow in the footsteps of the closely related companies which have already passed through the transition stage. Concretely stated, the sales organizations of motor truck, tractor and trailer companies should be composed of men trained in the fundamentals of highway transport and the efficient use of the equipment manufactured by the company which they represent.

Failures of highway transport enterprises are occurring every day, due to a lack of knowledge of the fundamentals of the economics, science and art of highway transport. It is reported that ninety per cent of all highway transport companies doing business with New York City as a center fail within three years after entering this field. While fifty per cent may fail, due to cut-throat competition by fly-by-night companies, it is conservatively estimated that at least fifty per cent fail because of lack of knowledge of the A B C's of efficient highway transport business methods, cost accounting, management, and the operation and maintenance of equipment.

HIGHWAY TRANSPORT EDUCATION

We find a satisfactory status relative to the development of highway transport education in the universities throughout the United States. In some institutions, the logical development occurs by the men having charge of highway engineering courses giving courses in the related field of highway transport. In other institutions, such courses are offered by the department of economics or business administration.

If these departments are to teach highway transport efficiently, the instructors must have a knowledge of the fundamentals of the economics and science of highway engineering and practical highway transport. It is expected that notable developments will take place along these lines, especially when authoritative texts are available. We have a development, in the main, of undergraduate instruction in the fundamentals of highway transport.

GRADUATE COURSES

The practicing engineer may secure advanced knowledge pertaining to modern practice in his speciality by the

utilization of one or more of the following agencies: (a) technical literature; (b) meetings and transactions of technical societies; (c) graduate engineering courses in technical institutions.

American educational institutions offer the following channels which are open to men who desire to equip themselves for the profession of engineering.

1. A bachelor of arts, bachelor of philosophy, or bachelor of science collegiate course with electives in engineering.

2. A four-year course in general engineering.

3. A four-year course in a special field of engineering.

4. A graduate engineering course requiring a baccalaureate degree and a total attendance in educational institutions of from five to six years.

5. Graduate engineering courses after having followed out one of the educational lines outlined above.

By a judicious utilization of educational facilities, the acquisition of an educational training for any given branch of the engineering profession may be attained by several combinations of the courses previously mentioned.

As used in this paper, graduate courses for practicing engineers refer to advanced specialized courses designed primarily for men who have taken a first degree in art, science, or engineering; who have acquired a knowledge of fundamental principles upon which such advanced courses are based; and who have had a certain amount of practical experience in engineering work.

Based on an experience with graduate courses for practicing engineers extending over a period of fourteen years, it has been found that the following classes of men are interested in such courses:

(a) Graduates of four-year bach-

elor of science courses in general engineering and graduates in non-technical courses who wish to equip themselves for a special field of engineering work.

(b) Graduates in civil, chemical, electrical, mechanical, and mining engineering courses who come in contact with problems or fields of work, with reference to which they desire detailed information based on modern engineering experience.

(c) Non-graduates who may be engineers, chemists, contractors, manufacturers, or others interested in some special branch of engineering and who have acquired a sufficient knowledge of the fundamental principles to enable them to carry on advanced work satisfactorily.

As a definite indication of the demand for advanced courses in special fields of engineering will be cited the fact that during one year one hundred and ten men, whose average age was twenty-seven years, enrolled in the graduate professional short-period courses in highway engineering and highway transport at the University of Michigan.

The conclusion has been reached by experienced engineers that, if graduate courses are to meet satisfactorily the demands of the profession, the following conditions should be fulfilled:

1. The courses must be given by specialists who are acknowledged experts.

2. The courses must be given under such conditions that it will be practicable for practicing engineers and others engaged in engineering work to take advantage of the opportunities offered.

3. The graduate work must be broadly administered so that the courses of instruction are open to any mature man, provided he can satisfy the prerequisites for the given course or courses which he desires to take.

4. The content of the courses must

cover detailed information pertaining to the most recent developments of modern practice.

5. The methods of presentation of the subject matter of the course must be adaptable to the class of men enrolled.

6. Ample facilities must be available for conducting research work in laboratories, libraries and in the field, where every phase of the special field of engineering covered by the graduate courses may be investigated.

Book Department

HEBER BLANKENHORN. *The Strike for Union. A Study of the Non-Union Question in Coal and the Problems of a Democratic Movement. Based on the Record of the Somerset Strike, 1923-24.* Pp. 259. Price, \$2.25. Published for the Bureau of Industrial Research, by the H. W. Wilson Company. New York: 1924.

Mr. Blankenhorn is a trained industrial investigator with a purpose. The obvious purpose is to see how far the labor movement is willing and ready to assume a commanding position in the management of industry. He therefore addresses himself in this book not only to the problems of a union pitted against the employers and against the organized coercive power of the community controlled by the latter, but also to the matters of internal democracy in the union and of the degree of responsibility felt by the leaders towards the community and toward their own members. Mr. Blankenhorn's conclusions are not super-optimistic on the last named score. Yet he holds out the hope of an ultimate reform of capitalist industry by the union and of a reform of the union by its rank and file membership. The critical reader will probably query whether an outsider like Mr. Blankenhorn can, in all fairness, pass authoritative judgment upon the acts of national union leaders, who, in the very nature of their position, must take into account many more factors than are visible to a local investigator, however well trained and penetrating.

S. PERLMAN.

JOSEPH, H. W. B. *The Labor Theory of Value in Karl Marx.* Pp. 176. Price, \$2.00. New York: Oxford University, American Branch, 1923.

In *The Labor Theory of Value in Karl Marx*, the author, a fellow and tutor of New College, Oxford, undertakes to show that the theory is fundamentally false and that the widespread acceptance of it among the laboring classes is doubly mischievous,

because it makes "their justified resentment at the working of the economic order take the form of denouncing one definite alleged injustice," and because "it exasperates those whom they attack by the injustice of the particular allegation."

After a restatement of Marx's theory, Mr. Joseph devotes chapters to (a) the inconsistency between the consequences of the theory and fact, (b) homogeneous human labor, (c) the individual relativity of value, (d) the illusion of absolute values, and (e) some morals and a conclusion.

In an elaborate abstract discussion, Marx's theory, which he borrowed from earlier English economists, is completely disproven. Mr. Joseph himself refers to it as having received "very damaging criticism long before" Marx made use of it.

As a plain matter of fact, the author seems to have selected the weakest part of Marx's work to attack, and he nowhere shows any appreciation of the value of the labor theory for purposes of propaganda. He makes no reference to Marx's profound study of economic history.

The letter of economic theory leaves no justification for labor as a sole basis of value; the spirit of the economic interpretation of history offers at least some foundation for the feeling of injustice which the worker has as to his share in the proceeds of production.

Such a view is outside the limits set by the author for his study. The reviewer is constrained to raise the question why in such a survey a broader perspective was not adopted. To disprove the soundness of the labor theory of value is merely an exercise in the mechanics of logic.

FRED E. HAYNES.

DOWNEY, E. H. *Workmen's Compensation.* Pp. xxv, 223. Price, \$2.00. New York: The Macmillan Company, 1924.

The author of this book, Dr. E. H. Downey, was, at the time of his accidental death after the manuscript was completed, the foremost American authority on workmen's compensation. He was by training

an economist and an actuary, and from the very beginning of compensation acts in this country was connected with their practical administration.

Dr. Downey's purpose in writing this book was two-fold: (1) To present his conceptions of what is an adequate and practical system of compensation for industrial accidents; and (2) to show how far short existing compensation acts fall of these standards. Both of these purposes are fulfilled in a manner which leaves little room for disagreement or criticism.

Dr. Downey bases his conception of what compensation acts ought to accomplish upon the proven fact that most work injuries are attributable to inherent hazards of industry. From this he concludes that each industry should bear the cost of all injuries arising therein, whether accidents or occupational diseases. Theoretically this leads also to the conclusion that industry should bear the entire loss due to work injuries, but Dr. Downey recognized that practical considerations justify a somewhat lower scale of benefits. What he advocates is full medical relief and benefits commensurate with wage loss (75 per cent of the wage loss for temporary disability), payable during the entire period of disability or dependency.

It is in this most important matter of benefits that existing compensation laws are most seriously inadequate. Even under the most liberal of them, industry bears less than half of the direct monetary cost of work injuries, and under some of them less than one-fourth. Other deficiencies in existing laws Dr. Downey finds in the exclusion of many classes of workers, in administration which permits of needless litigation and delays in the payment of claims, and in inadequate regulation of compensation insurance.

The net impression created by this discussion of the shortcomings of existing compensation laws is somewhat depressing. One wishes that Dr. Downey might have elaborated upon his brief statement that, measured by the situation which obtained before compensation, the advance has, nevertheless, been very great. After all, however, what is most important is to bring home to the American public the fact that

existing compensation laws are still very inadequate and for this reason have failed to accomplish all that they might accomplish in reducing the social cost of work injuries. In establishing this fact, Dr. Downey has rendered the greatest possible service to the advancement of labor legislation in this country.

JOHN R. COMMONS.

LUBIN, ISADOR. *Miners' Wages and the Cost of Coal*. Pp. 316. Price, \$2.50. New York: McGraw-Hill Book Company, Inc., 1924.

In *Miners' Wages and the Cost of Coal*, Mr. Lubin sets as his goal an analysis of the wage system of the organized fields of the bituminous coal industry and a consideration of the effect of that system upon "the welfare of all who are concerned with the coal industry." The rate structure of the non-union fields is discussed only incidentally, its examination being reserved for a later volume.

In Chapter I is given a brief survey of the commercial coal fields, an excellent description of mining methods and the manner in which the work of coal mining is carried on underground, together with a classification of wage earners. Then follows a consideration of the structure, function, and membership of America's most powerful labor union, the United Mine Workers. This "close-knit, well-defined and more or less centrally controlled" national organization is contrasted with the numerous, local, independent operators' associations, which are seldom capable of concerted action because of severe competition. Despite this anomaly, the industry, except for the strikes of 1919 and 1922, has been "peculiarly free from national labor difficulties."

Mr. Lubin describes the Interstate Joint Conference, the wage-determining machinery of the organized areas, which fixes the rates for the basing points of the four districts of the Central Competitive Field, comprising Illinois, Indiana, Ohio, and western Pennsylvania. Separate district conferences then adjust the rates at the various mining centers to these basic rates, and sub-district conferences make modifications, whenever necessary, to meet peculiar

local conditions. Wage scales in the outlying districts, originally based upon local conditions, are adjusted by independent district conferences to meet the changes put into effect for the Central Competitive Field. Thus, there is no national system of wage negotiation, but "a series of independent yet interdependent local wage agreements," separately arrived at; yet, in the last analysis, "union wages in all districts of the country go up and down together," the extent of rate changes being determined by the Joint Interstate Conference.

Underlying this wage system is "the definite principle of competitive equality." This principle, the author states, "has ostensibly been the basic factor in determining the rates fixed for the various mining centers of the country," and was originally accepted "in order that as many operators as possible might become parties to the collective bargain." Both sides, however, according to Mr. Lubin, from the beginning have differed in their interpretation of the principle. To the operators, competitive equality has meant "access to the market, irrespective of variations in mining conditions," and to the miners it has meant "uniform minimum earnings for all miners irrespective of local conditions."

This dual interpretation of the principle of competitive equality does not, in the reviewer's opinion, date back to the origin of the Joint Interstate Conferences. Both groups, in his opinion, attempted to modify the wage rates as far as practicable on the principle that all mines in a given district be permitted to produce coal and to place it on the market. The shift in the interpretation of competitive equality on the part of the union, if such has occurred, is of comparatively recent origin. It must be kept in mind that both operators and unions, as Mr. Lubin himself states, are prone to seize upon my argument which will enable them to secure a more favorable economic position. This principle has never been accepted as applicable to day rates except in the case of two or three sub-districts of southern Ohio.

In fixing pick-mining rates, the author points out that certain factors, such as distance from markets, the thickness of coal seams, the quality of the coal, freedom

from impurities and other deficiencies, have guided wage negotiations. The freight rate differentials to offset long hauls, he concludes, while of consequence in establishing the original rate structure, of late have been "relatively insignificant in determining wage rates and in obtaining competitive equality."

In setting rates to cover work that "is not directly productive of coal," such as timbering, removing impurities, laying tracks, pushing cars, etc., "little attention has apparently been paid to competitive equality." In the more highly organized districts these rates "are fairly standardized and where the union has little power no unity of treatment exists." In some mines individual bargaining is still maintained.

Machine mining rates are set by deducting a fixed amount from the pick rates. The machine differentials vary widely from district to district. Two theories have been advanced for determining these rates. "The miners contend that the machine rate should be equal to the pick rate minus the cost of maintenance and a fair profit, and the operators contend that the machine rate should be an amount which will yield an income to the machine miner equal to that of the miner working under a pick rate." Both theories have been applied in the different districts, the local bargaining power of the opposing parties determining which theory was to be given greater consideration.

When speaking of thick and thin vein differentials, Mr. Lubin is not always clear. At times he infers, and twice definitely states, that the theory underlying these principles is "in direct contradiction of the principle of competition," and yet he finally concludes "that the principle of competitive equality ultimately plays a part even in the fixing of the differentials for the thick and thin veins."¹ The confusion seems to exist in a failure to differentiate between piece rates and actual earning power. Many of the thin veins are being operated because the coal produced is of a superior quality. Piece rates, as an item of cost, in such cases

¹ Compare pp. 93 and 94 with p. 100 and more particularly 179, 180 and 183 with 266, 267 and 280.

are not comparable. In other instances, the higher piece rate may be offset by proximity to markets (as in the case of northern Illinois), favorable freight rates, greater accessibility to coal veins and geological conditions which facilitate the work of mining. Does the true relation between the piece rates of thin and thick veins become apparent until a comparison is made after multiplying the rates by the respective units that can be produced in a given time?

As the result of his investigation of the wage system of the organized fields of the bituminous industry, Mr. Lubin arrives at the following appraisal:

A general lack of unity pervades the entire structure and everywhere the results of trading and compromise are evident. Among the essential features which have been discussed, the following stand out as worthy of emphasis:

1. The pick-mining rates vary even as between those districts where conditions are fairly uniform and frequently the same rate is paid to pick miners working under widely differing conditions.
2. The differentials between thick and thin veins are characterized by inequalities that are the outgrowth of conditions which prevailed locally in the past—conditions which in many instances no longer exist.
3. Machine differentials vary from district to district and from sub-district to sub-district, the determining factor being the relative bargaining strength of the operators and the miners.
4. Dead-work and deficiency rates do not show even an approximation to consistency. Standards vary between districts, between sub-districts, and between individual mines in the same sub-district.
5. Only in the day rates for inside labor does one find a close approach to uniformity. Even here, however, significant variations prevail.
6. Rates for outside day men, owing to the absence of complete union control, show an irregularity almost as great as that which characterizes the dead-work and deficiency rates.

While the interstate agreement has eliminated the cut-throat competition which characterized the organized areas of the bituminous industry in the eighties and nineties of the last century, the author believes that "the principles adopted for adjusting wage rates have not in any large measure served the purpose for which they were originally intended." The present rate structure to a very large degree in many districts "is little more than the

crystallization of the system of rates that happened to be in effect when the United Mine Workers first gained recognition." He concludes that:

From all appearances, then, we may look forward to a continuation of the present chaotic wage-rate structure. Trading and compromise rather than a scientific analysis of the work to be done will in all probability continue as the basis of rate making in the organized fields. In the non-union fields wage cuts and wage increases may be looked for with every significant fluctuation of the market. And with it all one may expect a continuation of the unstable labor conditions which prevail in the bituminous coal industry—an instability which cannot be eliminated so long as the organized workers and union operators must cope, not only with local rate adjustments but also with a competition which is based not so much on the relative efficiency of the competing operator groups as on the power of one of the groups to control the wage rates it pays to its labor. Such is the price we must pay if we will to keep the United Mine Workers out of the unorganized fields.

The effect this wage system has had upon the well-being of the miner, the operator and the consuming public, Mr. Lubin summarizes in Part II of the last chapter:

The prevailing wages system has brought about no abnormal increases in mining wage rates. Since the inauguration of the Interstate Joint Conference, tonnage rates have not advanced proportionately as fast as have the rates paid to labor in other organized industries. Advances to day men have been about 16 per cent greater than the advances made to labor in industry as a whole. These wage-rate advances have had their effect on the cost of mining coal; but there is no direct relationship between the changes in labor costs due to wage advances and the changes in coal prices. Many factors equal in importance to labor costs have determined the market prices of bituminous coal. While there have been periods when advances in coal prices have been much greater than the increase in labor costs would have warranted, there have also been periods when coal prices have been so low as to leave little margin above the outlays for labor.

To the extent that the wage-rate system has made use of differentials it has proved economically wasteful. Although the machine differential has not up to the present time visibly affected the installation of machinery to any appreciable degree, it has, theoretically at least, kept from the consumer part of the savings which

result from the use of machinery. The machine differential has also maintained in operation certain pick mines whose product could not otherwise meet the competition of machine-mined coal.

The freight and thin-vein differentials likewise make possible the operation of many mines which have little or no economic justification for existence. Like the machine differential they are indirectly a cause for the overexpansion that today characterizes the bituminous industry. To this overexpansion can be attributed in large part the irregularity which today prevails in coal mining—an irregularity which has brought with it loss of earning power for both the miners and the operators and high cost of coal for the consuming public.

In the examination of miners' wages and the cost of coal, Mr. Lubin has presented in readable form an exceedingly intricate and confusing wage system. The book shows wide reading and a knowledge of the variety of technical difficulties with which this industry is beset. The description of rate making has been admirably handled. The treatment of the many differentials which have played an important part in rate setting is a contribution. However, there is still needed a further analysis which will correlate the various differentials with labor and production costs, prices and quality of coal, the thickness of the seam and miners' earnings. The author has forcibly stated the problem facing the union miners and the operators.

The analysis of the effect of these differentials upon the overdevelopment of the industry, while suggestive, is far from conclusive. A statistical treatment which will measure, even approximately, the relation between the various differentials and overdevelopment is a task still to be accomplished before definite conclusions are permissible.

W. E. FISHER.

YOST, CASPER S. *The Principles of Journalism*. Pp. vii, 170. Price, \$1.50. New York: D. Appleton & Company, 1924.

CRAWFORD, NELSON ANTRIM. *The Ethics of Journalism*. Pp. viii, 264. Price, \$2.75. New York: Alfred A. Knopf, 1924.

The American newspaper is something more than a commodity to be produced and

marketed on the same principle as are shoes, matches, and soap. The newspaper is a public institution with a definite responsibility in the formation and maintenance of social ethics and other social standards. This is the gist of two books which herald an increasing social consciousness in journalism—*The Principles of Journalism*, by Casper S. Yost, and *The Ethics of Journalism*, by Nelson Antrim Crawford.

Both authors speak with authority. Mr. Yost, as one of the founders of the American Society of Newspaper Editors, is the leading figure among newspaper men in the attempt to raise the standards of the profession and its resulting product. He is editor of the *St. Louis Globe-Democrat* and has been a working newspaper man for forty years. Professor Crawford is head of the department of Industrial Journalism in Kansas State Agricultural College and has been a daily newspaper man.

The student of journalism cannot but find reason to be optimistic in the appearance of these volumes. Heretofore the greatest concern about the social relationships of the press has been confined to those outside newspaper offices. With leaven working both within and without the press, some important change is bound to occur.

Each author sees sharply the essential basis of present journalism—that the newspaper has a profound influence in the formation of ideas and the guidance of actions of the reading public, and that, as the critics of journalism have not always seen, the press of today is a product of the society of today and is as good or as bad as are its readers.

Of the two books, the more scientific and more analytical is Mr. Crawford's. With a clear, incisive style and few wasted words, the younger man outlines the newspaper as it is and furnishes scientific reasons for that condition. Mr. Yost, on the other hand, describes in an idealistic way the press as it should be if it coincides with the best traditions of journalism. His style is rambling and redundant. The meat of the book could be presented better in half the space.

Crowd psychology as the explanation of the tendencies of present-day journalism is held by the Kansas teacher. This is a

pioneer stand within the ranks of journalism and is a long step toward putting newspaper work upon a scientific rather than a hit-and-miss basis. It is the real contribution of Professor Crawford's book. Of great value, also, is a very complete bibliography.

The teacher of social science too frequently discusses public opinion and the newspaper without intimate knowledge of the technical nature of the latter. These books offer an opportunity to become acquainted with such essential facts as he would like to know. And they are interesting reading. The journalist, the teacher and the general reader will find little that is dull in them and a great deal that is of importance in his daily living.

LESLIE HIGGINBOTHAM.

MCCULLOUGH, J. E. *Home, the Savior of Civilization*. Pp. 633. Washington, D. C. Southern Cooperative League, 1924.

This is a large volume compiled for the use of families at their family altars. It consists of daily readings for the year for the "home council"—the name given the family group in its religious studies.

The quotations that serve as reading materials are gathered from widely scattered sources, ranging from the Bible, revised into modern English, to selections from the prose and poetry of the renowned and less renowned of many generations, but chiefly of those of the last century and our own.

The purpose of the book, as the title implies and the introduction states, is to make of the home "God's garden of character; the soul may grow elsewhere, but it grows to perfection there." The home should be the bulwark of civilization, the school of the spirit, and this book is the text which its initiator and editor evolved with his family in his own home, with what he and his friends have felt to be good results. He is now passing on his program to any who are interested in keeping the family altar a supreme element in the home, and in finding some concrete way of doing it.

MALBONE, GRAHAM W. JR., assisted by Robert C. Binkley. *New Governments of Central Europe*. (American Political Sci-

ence Series, Edward S. Corwin, general editor. Pp. x, 683.) Price, \$5.00 (library); \$4.00 (educational). New York: Henry Holt and Company, 1924.

This book is an excellent example of one type of service which it is the function of political scientists to perform in making their distinctive contribution to the ordering of a disordered world. It presents a careful study of the processes of disintegration and integration through which the political institutions of the peoples who composed the "Central Empires" passed during the fateful decade, 1914-1924. The historical and economic connections of the movement are deftly and, on the whole, adequately made. The new constitutions of the resultant states, Germany, Austria, Hungary, Czechoslovakia and Yugoslavia, are analyzed and the governments for which they provide shown at work upon the problems which they must solve before that infinitely complex and difficult task, the stabilization of Europe, is completed.

The author follows substantially the same plan in the presentation of his material upon each state. After sketching the historical antecedents of the then existing governments he describes briefly their organization and operation in 1914. Then, step by step, he traces their downfall and reconstruction. The factors in their destruction and regeneration—men, parties, political programs, long-repressed racial ambitions and antipathies, sectional and class jealousies, fears, hatreds and desires—are depicted in proper perspective. An enormous number of facts concerning all of these elements, and especially with reference to the programs of parties and leaders, are presented. The constitutional and legal relations between successive governments are clearly set forth. The "summary and conclusion," with which most of the sections end, present brief reviews of the movements which have been traced in detail and, in some instances, carefully considered estimates of their results. In the final chapter the author sets forth his conclusions as to the underlying unities which are to be found in the processes of national liberation through revolution and the consequent re-establishment of orderly governments through which all of these states

have passed. He also discusses briefly the very interesting subject of the relations between the Vatican and the new states.

Interesting and valuable features of Professor Graham's book are the "time charts" with which he has graphically portrayed the succession of cabinets and parties of each country in relation to time and to crucial political events, and a collection of 144 select documents, "of very real constitutional importance which are not to be found in collections of European constitutions." The volume, one of the first of the "American Political Science Series," is well written and edited and is beautifully printed. It does exceedingly well what it purports to do: "To fill a very obvious lacuna in the literature on comparative government."

RALSTON HAYDEN.

ARBITRATION TREATIES AMONG THE AMERICAN NATIONS. Edited by William R. Manning. Pp. 472. Price, \$3.50. New York: Oxford University Press, American Branch.

This publication, of the Division of International Law of the Carnegie Endowment for International Peace,

is designed to include, in so far as it has been practicable, all arbitration treaties, and all arbitral clauses of other treaties, which were signed between or among American nations before the close of 1910 and duly ratified.

The volume contains two hundred and twenty-eight such agreements, and seems to be fully and carefully what it claims to be, and nothing more. The interest is entirely in the documents themselves. There are two tables, chronological and alphabetical, but no index. The latter would, however, add little to the ordinary usefulness of the book. There is no introduction; and the notes confine themselves, without important exceptions, to concise information regarding sources and ratification.

The text is English throughout, "a counterpart of the present volume in the original languages" being "withheld awaiting the reception of the English version." The questions of policy connected with this

mode of procedure must doubtless be left to the editors. But, given the decision to publish an edition like the present, it seems not improbable that the audience, most likely really to be satisfied by an English translation, might have been advantageously provided with at least brief historical and interpretive notes. Still, for most purposes, the work will doubtless provide all that is needful as it stands; and it will certainly prove helpful in its scope, its availability, and its careful references to other publications of each treaty.

MOWAT, R. B. *The European States System.* [The World's Manuals series.] Pp. 96. Price, \$1.00. New York: Oxford University Press, American Branch, 1923.

This is a clear, concise, well-proportioned summary of how states in their relations with each other have progressed from status to contract. Early treaties were between pairs of nations only. Then came Machiavelli, Grotius, and the Treaty of Westphalia. The treaties of 1648 and 1659, establishing religious settlements and state boundaries, "represented a tendency toward international comity, toward the recognition of a *European States System*."

Europeans consciously began to preserve the equipoise, the balance of power, founded at Westphalia. Since then no person or set of persons has had in any one period both the will and the power to make an assault upon this European System. Their attempts have only modified it. Louis XIV failed. The Treaty of Utrecht, a European settlement, merely readjusted the work done in 1648.

The French Revolutionists' and Napoleon's assaults failed. The Congress of Vienna with its readjustments "was not meant to put Europe into a cast-iron system, but only into one which would be subject to orderly development, not to catastrophic revolution."

The latest attempt in 1914 has ended with the Treaty of Versailles. This provides for a fuller written system not only for Europe but for the whole world. "The Concert Powers have reinforced the old System with an additional member, the

League of Nations;" "the Concert has been replaced by a more organized body."

The book is throughout readable, interesting and suggestive.

D. R. MOORE.

BLANC, ELSIE TERRY. *The Co-Operative Movement in Russia*. Pp. 324. Price, \$2.50. New York: The Macmillan Company, 1924.

This is a serious and thoroughly impartial study of a most important phase of modern Russian life. It is unfortunate that the author's style seems so ponderous and the book such difficult reading, for it contains much interesting and enlightening material.

Although the history of the co-operative movement is traced in detail from its beginning in the 19th century as a conservative bourgeois venture, the description given of the part played by the co-operatives in the economic life of Russia since the revolution is the most interesting part of the book.

During the early period of Bolshevik rule, the co-operators were regarded by the government as "counter-revolutionary," and the author admits the truth of this charge. Furthermore, the thorough-going communistic program inaugurated by the Soviet government left no place for the co-operatives, as their property as well as that of individuals was nationalized.

But with the abandonment of Communism and the inauguration of the new economic policy of the Russian Government, the co-operatives were made the agency of the government whereby trade with Western Europe was re-established.

The author professes to look for the realization of the hope for world-wide peace and democracy when the co-operators of the

world unite on an international basis. She concludes with this statement:

In this movement, which spells a possible salvation for all nations, the Russian co-operators, working hand in hand with the Soviet power, are holding aloft a torch of light.

This is a consummation devoutly to be desired, but it seems too much to expect. If the Russian co-operators succeed in re-establishing economic stability in Russia, they will have rendered an inestimable service not only to that country, but to the world.

KENNETH D. MILLER.

LANE, TAMAR. *What's Wrong With the Movies?* Pp. 254. Los Angeles: The Waverly Company, 1923.

What's Wrong With the Movies is a useless addition to the literature on a subject which already suffers from too much writing of personal opinion.

The conclusion of the author that while motion pictures possess great potentialities, there is something wrong with the directors, actors, producers, authors, censors, comedians, exhibitors and critics; is based on an intimate discussion of those who earn their living in the various branches of the industry. Generally the reader is left in some doubt as to the exact nature of the difficulties which must be overcome before the industry can develop its potentialities. It is made clear, however, that whatever may be wrong, in a minor way, with the actors, managers and critics, there is nothing right about the censors. No constructive program is offered.

This book can be recommended for those who like quantities of personal gossip.

DONALD YOUNG.

Index

- Accidents, prevention, of grade crossings, 181; taxicab methods towards, 104.
- American Automobile Association, membership and activities of, 269-74.
- AUTOMOBILE AND ALLIED TRADES AND INDUSTRIES, THE. Alfred H. Swayne, 9-12.
- AUTOMOBILE AND AMERICAN AGRICULTURE, THE. John M. McKee, 12-7.
- AUTOMOBILE AND COMMUNITY PLANNING, THE. John Ihlder, 199-205.
- AUTOMOBILE AND RECREATION, THE. M. H. James, 32-4.
- AUTOMOBILE AND THE "HOME" OF THE FUTURE, THE. John F. Harbeson, 58-60.
- AUTOMOBILE AND THE PIONEER, THE. William Joseph Showalter, 21-5.
- AUTOMOBILE AND THE POLICE, THE. Arch Mandel, 191-4.
- AUTOMOBILE AND THE TRAVELING LIBRARY, THE—THE BOOK WAGON SERVICE. Katherine Tappert, 66-8.
- Automobile: advantages of, 4; average mileage of, 1; clubs, number and work of, 267, 268; deaths, 175; dealer, financial aid to, 44, 50; development of, 259; effect of, on general business, 6-8; on present-day living, 58, 59; extensive use, foreign expeditions, 22-24; finance company, 45; industry: growth of, 1; machine effect on, 38; operations in, 39; market; future world, 35; number financed, 49; owner, 33; ownership, 246; part of in financing highways, 166; passenger and trucks, world production of, 251; patrolling, methods of, 191; parked, 201; protection of, means of, 195; significance of cheap, 5; tourist, advantages of, 32; transportation engineering, science of, 29; use of in school transportation, 73-8.
- BARTHOLOMEW, HARLAND. Reduction of Street Traffic Congestion by Proper Street Design—How St. Louis Is Meeting Its Problem, 244-6.
- BAUGHMAN, E. AUSTIN. Protective Measures for the Automobile and Its Owner, 194-8.
- BIBBINS, J. ROWLAND. Traffic-Transportation Planning and Metropolitan Development—The Need of an Adequate Program, 205-14.
- BILLBOARD AND THE PUBLIC HIGHWAYS, THE. J. Horace McFarland, 95-101.
- Billboard: industry, 95; objections to, public and legal, 96-9.
- BLANCHARD, ARTHUR H. Place of the University in Good Roads and Automobile Transportation, The, 274-9.
- Block system, installation of, New York City traffic, 220.
- Book car movement, 66; service, 67.
- BRIGHT, JOHN IRWIN. The Plan of Philadelphia, 231-5.
- Business, expansion of into suburbs, 175.
- Campgrounds, public, provisions for motorists, 63.
- CAMPING SITES IN PUBLIC PARKS AND FORESTS. L. F. Kneipp, 62-6.
- CHAPIN, ROY D. Motor's Part in Transportation, The, 1-8.
- Church; city, effect of city progress on, 80; country, attendance, 85; automobile benefits to, 83.
- City Plan of Philadelphia, problem of, 231; planning, transportation influence on, 214; streets, effect of motors on, 200-4.
- Civil engineer; groundwork for, 275; graduate courses for, 277-9.
- CLIFTON, CHARLES. The Economic Future of the Automobile Industry, 34-6.
- COALE, JAMES J. Influence of the Automobile on the City Church, 80-2.
- Code of General Highway Traffic Regulations (Council of National Defense), Article III, 170.
- COLLINGS, HARRY T. The Relation of the Automobile Industry to International Problems of Oil and Rubber, 254-8.
- Congestion, 30; efforts to avert, 200, 202; traffic, Detroit, relieving, 241; suggestion towards solving, 234.
- CONNELL, WILLIAM H. The Highway Business—What Pennsylvania is Doing, 113-27.
- CONSOLIDATION OF SCHOOLS AND PUPIL TRANSPORTATION—THE USE OF THE AUTOMOBILE IN EDUCATION, Le Roy A. King, 69-80.
- Construction, types of on highways, 120-2.
- Crime, types of, due to motor, 192.
- CROSBY, W. W. Highway Location, 132-40.
- Deaths, due to motors, 194.
- Delaware River Bridge, 237.
- DEVELOPMENT OF THE FOREIGN OIL POLICY OF THE UNITED STATES, THE. Henry C. Morris, 262-3.
- DISTRIBUTION OF GASOLINE AND METHODS OF PRICE CONTROL. Huston Thompson, 89-95.
- DRAKE, J. WALTER. The Rubber Industry and the Automobile, 259-61.
- ECONOMIC FUTURE OF THE AUTOMOBILE INDUSTRY, THE. Charles Clifton, 34-6.
- Education, traffic safety through, 178-80.
- ENO, WILLIAM P. The Storage of Dead Vehicles on Roadways, 169-74.
- ESTES, J. A. Financing the Sale of Automobiles, 44-9.

- EXPORT TRADE IN AUTOMOBILES, THE.** H. H. Kelly, 251-4.
Export trade, U. S. automobiles, growth of, 251.
- Farm: life, effect of automobile on,** 13; motor vehicles on, 12; farmer, automobile and, 83.
Federal: aid, toward good roads, 271; Trade Commission, report on pipe lines (Standard Oil) 92.
- FINANCING OF HIGHWAYS, THE.** T. H. MacDonald, 160-8.
FINANCING THE AUTOMOBILE. Henry G. Hodges, 49-57.
FINANCING THE SALE OF AUTOMOBILES. J. A. Estey, 44-9.
Financial responsibility, assumed by taxicab, 104.
FOLLIN, JAMES W. Taxation of Motor Vehicles in the United States, 141-59.
FUNCTION OF THE MOTOR TRUCK IN REDUCING COST AND PREVENTING CONGESTION OF FREIGHT IN RAILROAD TERMINALS. T. C. Powell, 87-9.
- Gasoline, how sold,** 90; methods of distributing, 89.
Glidden Trophy, contests for by A. A. A., 274.
Good Roads Development, work of A. A. A. in, 271.
Governor and Judges' Plan (Detroit), 241.
GRAHAM, GEORGE M. Safeguarding Traffic—A Nation's Problem—A Nation's Duty, 174-85.
- HARRISON, JOHN F.** The Automobile and the "Home" of the Future, 58-60.
HIGHWAY BUSINESS, THE—WHAT PENNSYLVANIA IS DOING. William H. Corbell, 113-27.
HIGHWAY LOCATION. W. W. Crosby, 132-40.
HIGHWAY TRANSPORTATION. J. Gordan McKay, 127-32.
Highways: basis for location, 135; building program, national, 9; church location on, need for, 84; construction, Federal aid for, 165; costs, 167; defacement of by billboards, 96, 97, 100; development of, motor's part in, 259; engineering, present status of, 274; funds, administration of, 161; ways of obtaining, 164; main, 160; rural, 163; state: engineering basis of, 113; location of, 118; *Pennsylvania*, expenditures, organization, etc., 115-117; upkeep and control of, 123-7; selecting of system, 134; studies of, 137-9; transport education, 276.
HODGES, HENRY G. Financing the Automobile, 49-57.
HOFFMAN, PAUL G. Traffic Commission of Los Angeles, The—Its Work on the Traffic Problem, 246-50.
HYDE, DORSEY W., JR. Linking up Railroad and Water Transportation, 25-31.
- ILDER, JOHN.** The Automobile and Community Planning, 199-205.
Industrial workers, machine influence on, 38, 40, 41.
INFLUENCE OF THE AUTOMOBILE ON THE CITY CHURCH. James J. Coale, 80-2.
- JAMES, M. H.** The Automobile and Recreation, 32-4.
Japan, buyer of U. S. motor trucks, 253.
- KELLY, H. H.** Export Trade in Automobiles, The, 251-4.
KING, LE ROY A. Consolidation of Schools and Pupil Transportation—The Use of the Automobile in Education, 69-80.
KNEIPP, L. F. Camping Sites in Public Parks and Forests, 62-6.
- LEE, RICHARD H.** Serving the Motorist—The Work of the National Motorists' Association, 266-8.
Legislation, restrictive in erection of billboards, 99; work of A. A. A., 272.
LEWIS, HAROLD M. The New York City Motor Traffic Problem, 214-23.
License, issuance, of beginner's, 196; by examination tests, 184.
LINKING UP RAILROAD AND WATER TRANSPORTATION. Dorsey W. Hyde, Jr., 25-31.
LONG, JOHN C. The Motor's Part in Public Health, 18-21.
Loop outlets, Chicago, 212.
Los Angeles Traffic Commission, 246.
- MACDONALD, T. H.** The Financing of Highways, 160-8.
MACHINERY AND ITS EFFECT UPON THE WORKERS IN THE AUTOMOTIVE INDUSTRY. Charles Reittel, 37-43.
Machinery, development of, in American industry, 37.
Major street plan: Los Angeles, 249; St. Louis, 244-6.
MANDEL, ARCH. Automobile and the Police, The, 191-4.
Manning, Dr. Van H., report of, 262.
Markets, foreign automobile, 252.
McFARLAND, J. HORACE. Billboards and the Public Highways, The, 95-101.
McKAY, J. GORDAN. Highway Transportation, 127-32.
MCKEE, JOHN M. Automobile and American Agriculture, The, 12-7.
Medical treatment and automobile, 19-21.
Mileage, necessity for classification of U. S., 160.
Mills, Supt. of Police Wm. B., work of, 240.
Modern housing, tendency in, 58.
MORRIS, HENRY C. Development of the Foreign Oil Policy of the United States, The, 262-3.

- MOTOR'S PART IN PUBLIC HEALTH, THE.** John C. Long, 18-21.
- MOTOR'S PART IN TRANSPORTATION, THE.** Roy D. Chapin, 1-8.
- MOTOR:** activities incident to, 9-12; bus; use of, 3, 4; transportation, regulating and extent, 110, 111; conditions, yesterday, 266, 269; problems, efforts to solve, 35; transportation, average cost to highway users, 119; truck: aid of to railroads, 87; development, 2, 3; vehicle: control, 195; registration, 5, of New York City, 216; St. Louis, 244.
- National Automobile Chamber of Commerce,** work of, 264, 66.
- National, Conference on Outdoor Recreation,** first, 66; Parks and Forests, camping in, 64; use of by motorists, 18.
- NEW YORK CITY MOTOR TRAFFIC PROBLEM, THE.** Harold M. Lewis, 214-23.
- Oil policy, U. S. formation of,** 262.
- One-way streets, New York City,** 221; Philadelphia, 239.
- Parish organization, success of and motor influence on,** 86.
- Parking; and ranking of motor, definition of,** 169; methods of, 172; problem, 212, Philadelphia, 239.
- Petroleum and automobile,** 255, 256.
- PHILADELPHIA'S TRAFFIC PROBLEMS AND THEIR SOLUTION.** J. Borton Weeks, 235-40.
- PHILLIPS, T. GLENN.** Traffic Problems in Detroit and How They Are Met, 241-3.
- PLACE OF THE UNIVERSITY IN GOOD ROADS AND AUTOMOBILE TRANSPORTATION, THE,** Arthur H. Blanchard, 274-9.
- Planning, city and highway, safety in,** 181, 182; Plan of Chicago, purpose and work, 224-9.
- PLAN OF CHICAGO IN 1924, THE—WITH SPECIAL REFERENCE TO TRAFFIC PROBLEMS AND HOW THEY ARE BEING MET.** E. S. Taylor, 224-31.
- PLAN OF PHILADELPHIA, THE.** John Irwin Bright, 231-5.
- Police patrol, protective measures of,** 191.
- Politics, influence of on state highways,** 114.
- Population, density and motor ownership,** 207-10.
- Port and railroad lines, Philadelphia, situation of,** 233.
- POWELL, T. C.** Function of the Motor Truck in Reducing Cost and Preventing Congestion of Freight in Railroad Terminals, 87-9.
- Price leadership (oil), how held,** 91.
- PROTECTIVE MEASURES FOR THE AUTOMOBILE AND ITS OWNER.** E. Austin Baughman, 194-8.
- PUBLIC REGULATION OF MOTOR BUS SERVICE.** Delos F. Wilcox, 107-12.
- Public regulation, of motor vehicle carriers,** 31; road system, growth of, 132.
- PURITY OF ROADSIDE DRINKING WATER—WHAT PENNSYLVANIA IS DOING.** W. G. Turnbull, 60-2.
- Quadrangle development, Chicago,** 226.
- Railways, charges vs. motor truck,** 130; England, 87.
- REDUCTION OF STREET TRAFFIC CONGESTION BY PROPER STREET DESIGN—HOW ST. LOUIS IS MEETING ITS PROBLEM.** Harland Bartholomew, 244-6.
- REEVES, ALFRED.** What is the Job of the Trade Association? 264-6.
- Regulation, public, of street railways,** 108.
- REITELL, CHARLES.** Machinery and Its Effect upon the Workers in the Automotive Industry, 37-43.
- RELATION OF THE AUTOMOBILE INDUSTRY TO INTERNATIONAL PROBLEMS OF OIL AND RUBBER, THE.** Harry T. Collings, 254-58.
- Research work, in transportation problem,** 177.
- Roads, data regarding surfaced,** 161-3; scientific location of, 133.
- ROSE, SOLON E.** Traffic Violations and the Court—Detroit's Violation Bureau, 185-90.
- Round-the-world motor caravan, plans for,** 24.
- RUBBER INDUSTRY, THE, AND THE AUTOMOBILE.** J. Walter Drake, 259-61.
- Rubber, growth of industry,** 260; production, dependence of motor industry on, 259; search for, 257.
- SAFEGUARDING TRAFFIC—A NATION'S PROBLEM —A NATION'S DUTY.** George M. Graham, 174-85.
- Safe Driver's Club,** 36.
- Sales installment, automobile,** 44.
- SCHNADER, WILLIAM A.** The Taxicab—Its Service and Regulation, 101-06.
- School: children, traffic code to protect (Los Angeles),** 249; consolidation movement: history of, 69; growth of, 73, aid by motor bus, 78.
- SERVICES OF THE AMERICAN AUTOMOBILE ASSOCIATION.** Ernest N. Smith, 269-74.
- SERVING THE MOTORIST—THE WORK OF THE NATIONAL MOTORISTS' ASSOCIATION.** Richard H. Lee, 266-8.
- SHOWALTER, WILLIAM JOSEPH.** The Automobile and the Pioneer, 21-5.
- Signals, standardized driver and traffic,** 180.
- SMITH, ERNEST N.** Services of the American Automobile Association, 269-74.
- Smith, Governor, action of regarding state highway system,** 134; 178.
- Spaces, ranking and parking,** 171.
- Standard Oil Company, dissolution of,** 91; Standard Group, power of, 92-5; relations between, 92.

- State support, to school consolidation movement, 70-3.
- Statistics, need for accurate motor, 177.
- STORAGE OF DEAD VEHICLES ON ROADWAYS, THE. William P. Eno, 169-74.
- Street railways, 107.
- Surface car lines (Philadelphia), suggested elimination of, 236.
- SWAYNE, ALFRED H. Automobile and Allied Trades and Industries, 9-12.
- TAPPERT, KATHERINE. The Automobile and the Traveling Library—The Book Wagon Service, 66-8.
- TAXATION OF MOTOR VEHICLES IN THE UNITED STATES. James W. Follin, 141-59.
- TAXICAB, THE—ITS SERVICE AND REGULATION. William A. Schnader, 101-6.
- Taxation, motor, modes of (Federal, state, municipal), 141-3.
- Taxes, revenue from motor vehicles, 166.
- Taxicab, 4; service, 102, 104.
- TAYLOR, E. S. Plan of Chicago in 1924—With Special Reference to Traffic Problems and How They Are Being Met, 224-31.
- Taylor, Graham R. 30.
- THOMPSON, HUSTON. Distribution of Gasoline and Methods of Price Control, 89-95.
- Titcomb, Mary, 68.
- Title Law, Maryland, passing of, 197; titling law, 195.
- Trade practices, in taxicab business, 105.
- TRAFFIC COMMISSION OF LOS ANGELES, THE—ITS WORK ON THE TRAFFIC PROBLEM. Paul G. Hoffman, 246-50.
- TRAFFIC PROBLEMS IN DETROIT AND HOW THEY ARE MET. T. Glenn Phillips, 241-3.
- TRAFFIC—TRANSPORTATION PLANNING AND METROPOLITAN DEVELOPMENT—THE NEED OF AN ADEQUATE PROGRAM. J. Rowland Bibbins, 205-14.
- TRAFFIC VIOLATIONS AND THE COURT—DETROIT'S VIOLATION BUREAU. Solon E. Rose, 185-90.
- Traffic: analyzing conditions in, 137; classification of, 204; congestion, 193; New York City: concentration of, 214; future requirements and improvements, 221-3; present regulation, 210; offenders, punishment of, 183; problem, efforts of A. A. A. to solve, 273; problem, Philadelphia, 137; protection, national problem of, 174; regulations, Detroit, enforcing, 186; studies in by Penna. State Dept. Highways, 122; synchronized system, Philadelphia, 238; transportation program, requirements of, 206.
- Transportation, costs and needs, 211; history, 25, 26, 176; motor truck: Penna. and Conn., 129; national conference, 28; problem of (England and America), 87; system, defects and reasons for, 27.
- TURNBULL, W. G. Purity of Roadside Drinking Water—What Pennsylvania Is Doing, 60-2.
- Typhoid fever, control of epidemics, 60.
- United States Bureau of Public Roads, surveys conducted by and purposes of, 127-9; realization of, to oil peril, 262.
- Vanderbilt Cup, contest for, by A. A. A., 274.
- Violation Bureau (Detroit), creation of, 186-9; benefits from, 190, 242.
- Wages and machinery, 40.
- Water supplies, public, control of by, 60-2 (Penna. Dept. Health).
- WEEKS, J. BORTON. Philadelphia's Traffic Problems and Their Solution, 235-40.
- WHAT IS THE JOB OF THE TRADE ASSOCIATION? Alfred Reeves, 264-6.
- WHAT THE AUTOMOBILE HAS DONE TO AND FOR THE COUNTRY CHURCH. Warren H. Wilson, 83-6.
- WILCOX, DELOS F. Public Regulation of Motor Bus Service, 107-12.
- WILSON, WARREN H. What the Automobile Has Done to and for the Country Church, 83-6.
- Zoning: effect of, 210; Commission, Philadelphia, efforts of, 232; use of, 201.

